THE WELFARE OF THE SCHOOL CHILD

JOSEPH CATES, M.D.

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ENGLISH PUBLIC HEALTH SERIES

Edited by SIR MALCOLM MORRIS, K.C.V.O.

THE WELFARE OF THE SCHOOL CHILD

The mid-day rest.

PLATE I.

The Welfare of the School Child

BY

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With Six Half-tone Plates

NEW YORK

FUNK AND WAGNALLS COMPANY

LB3405
.C3

Gift
Publisher
SEP 8 1920

PREFACE

In these pages an attempt has been made to show the importance of healthy environment for the welfare of the school child. Attention is directed in various sections of the book to the need for comprehensive and complete Public Health administration. The School Medical Service in the early stages of its growth was largely occupied in the detection and treatment of defects. The time has now come to attack the beginnings of disease and the causes of illness. Under the direction of the Ministry of Health all the forces of Preventive Medicine must be marshalled for the fray.

In preparing the book, use has been made of the publications of Government Departments, and in particular the Annual Reports of the Registrar-General and of the Medical Officers of the Local Government Board and the Board of Education.

To my friend Dr. Austin Nankivell I am deeply indebted for valuable criticisms and advice.

J. C.

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THE WELFARE OF THE SCHOOL CHILD

INTRODUCTION

THE nation has emerged victorious from the terrible ordeal of a European war. A four-years' deathly combat has left upon her marks which time alone can efface. Freely she threw into the fight her best of men and her gold, yet there were moments in that long night when it almost seemed that her efforts would be without avail. The day of triumph dawned, and with it came a pestilence more destructive than the ravages of war, taxing mainly, too, the lives of healthy adults. So serious was the epidemic that in many districts the death-rate was more than double the rate at which children were born. In some homes nearly every member of the family died.

The School Child

Happily, there is no doubt that from both war and disease the country can recover, and can make up the loss in man-power and in wealth.

An earnest, whole-hearted attempt must be made to build up a healthy nation.

Systematic medical inspection has revealed an appalling amount of disease and defect among the children attending the public elementary schools, and examinations carried out for recruiting purposes during the War have brought to light the crippling effects of illness in childhood.

The experience of the School Medical Service goes to show that 80 per cent. of school children need dental treatment, 10 per cent. are suffering from malnutrition, 20 per cent. from eye defects, 3 per cent. from disease or defect of the ears, and the same proportion from enlarged tonsils and adenoids. There are as well a large number with so-called minor ailments, conditions which, untreated, are often the beginning of serious disabling disease.

From an economic standpoint it is an unsound policy to provide a system of edu-

cation and leave untouched defects which prevent a child obtaining full benefit therefrom. The financial burdens willingly undertaken by the State call for the strenuous exertions of every member of the community to increase the output from factories and workshops and from the land. Highly skilled workers are needed not only for industrial processes long established but for the perfecting of trades in markets yet to be won. The physically sub-normal children unequal to compete with the able-bodied, and as a rule insufficiently educated to obtain any kind of clerical work, furnish the majority of the recruits for the ranks of the unemployed. At a later stage many of them become destitute, and a lifelong charge on the nation. In the narrowest aspect it is surely advisable to secure adequate treatment, and in certain instances, by special methods of training, make those ailing and defective children an asset of the State.

But a broader view must be taken of the national importance of healthy childhood. The weakly boy, the feeble youth, the physically inefficient man, are but stages in the

journey along which diseases of infancy pass unchecked.

A C3 population does not acquire its characteristics in a day, nor does it pass away without leaving a legacy.

In considering the welfare of the child of school age some thought should be given to influences which have already begun to mould the plastic frame. The effects of unfavourable ante-natal conditions, and the dangers that beset the infant and the young child, form the themes of other volumes in this Series*; but the present volume will lack completeness unless those conditions and dangers are glanced at in these introductory pages.

Each infant, then, carries into school the result of five years of home life. For good or for evil this period will be largely responsible for the physical and mental condition of the entrant to school.

Parental ignorance, the illnesses of babyhood, an unhealthy home—these and other factors go to make the ailing, puny child,

* *See* "The Welfare of the Expectant Mother," by Mary Scharlieb, C.B.E., M.D., M.S., and "Infant and Young Child Welfare," by Harold Scurfield, M.D., D.P.H.Camb. 1919.

and no scheme to safeguard the health of the school child is likely to show complete success unless there is included the care of the infant under school age.

But the health of the baby does not begin at birth. At least nine months before is a vulnerable period, during which, when life is not destroyed, the career of the future infant may be materially crippled.

Of the extent to which ante-natal conditions cause infant mortality, sickness, and a low standard of health in childhood, youth and adult life, it is as yet impossible to speak with any degree of certainty. The laws dealing with the registration of births and deaths expressly exclude any official record of stillbirths. Neither is it known with what frequency miscarriages occur. It has been estimated that two stillbirths and nine miscarriages take place for every hundred live births. In other words, there is a mortality of infants before birth as great as that which occurs among the survivors during the first year of life. A special inquiry in one large city showed that no less than 25 per cent. of pregnancies failed to result

in a living full-time child. During the year 1917 over 20,000 deaths of children under one year of age were certified as due to premature birth.

Ante-natal causes, therefore, exact a heavy toll during the nine months of fœtal life, and it is only reasonable to expect that they continue to operate after birth.

In 1917, out of 64,483 deaths occurring in children under one year of age, 25,044 took place within a month of birth, and 8,355 of these occurred within a week. No less than 7,377 babies failed to survive the first day of life, and it appears fair to assume that for the cause of the majority of these deaths search must be made among influences acting through the parents.

Reference to the different causes of death in infancy affords striking evidence of the importance of parental health.

Premature birth, congenital defects, and wasting diseases together were responsible, at least so far as certificates of deaths can be accepted as trustworthy evidence, for 76 out of every 101 deaths during 1917 in children under one year of age.

It is safe to conclude that the majority of deaths due to these conditions are attributable to causes acting before birth, and also to lack of care and skilled assistance at the time of confinement.

When it is realised that out of a thousand pregnancies, ante-natal causes bring about within a year and nine months a fatal termination in approximately two hundred instances, some idea will be obtained of the magnitude of the devastation. It may be useful, therefore, to attempt to define some of the unfavourable influences which may act through the parents before the birth of their offspring, and to discover in what measure they may be prevented.

Of the amount of infant sickness and ill-health during childhood and youth attributable to ante-natal causes, there is as yet insufficient evidence to warrant a definite estimate. However, it may be said that a high infant death-rate in a given community implies in general a high death-rate in the next four years of life, while a similar association is found between low death-rates at both age-periods.

It has been shown that children of school age suffering from malnutrition commonly come from families where there has been a relatively high rate of infant deaths, and it may be expected that any condition likely to bring about infant death will certainly entail a large amount of sickness in childhood.

The effect of parental sickness on the health of the children is more important than might at first sight appear. Ill-health of the father, tending to inefficiency as a workman, leads to poverty and domestic privation, and causes the family to drift into insanitary surroundings. Maternal sickness often brings about neglect of infant care, the abandonment of breast-feeding, and lack of attention to general household duties. Venereal disease is a potent agent in infant mortality. Evidence given before the Royal Commission on Venereal Diseases showed that of 102 children examined at a blind school, in 47 instances the blindness was due to venereal disease. A similar investigation at a French institution suggested that 50 per cent. of cases of blindness could be traced

to the same cause. Another witness stated that the histories of 34 syphilitic mothers showed that only 16 per cent. of children born alive were apparently or doubtfully healthy.

A high infant mortality may arise from the inexperience associated with unduly early motherhood. The home surroundings of the child of parents marrying before they are able to maintain a suitable home are likely to affect prejudicially the infant's physical condition. It has been shown that counties with a high proportion of wives under age have a high infant death-rate, and, on the other hand, that those with a low proportion of wives under age have a low rate of infant mortality. In this respect it must be remembered that the counties in which marriage is postponed to a more mature age are chiefly rural in character.

Certain occupations of parents, and particularly the industrial employment of mothers, have an unfavourable ante-natal effect on the health of their children. Beyond this, there is the even larger question of the neglect of home life and the lack of

motherly care and attention experienced by the children left under the charge of an elder child or a neighbour. Artificial feeding is resorted to at the earliest possible moment, with the attendant evils of unwholesome, contaminated food improperly prepared. At the close of a day of heavy work the employed mother has little inclination or physical capacity to carry out those important domestic duties essential to the cleanliness of the house and the comfort of the family.

The occupations of parents are so intimately bound up with social position and home sanitation that it is difficult to eliminate the other considerations involved. It is notorious, however, that deaths from measles, whooping-cough, and similar diseases are relatively rare among the children whose parents belong to the upper and middle classes. Statistics recently compiled show that the death-rate of children 6 to 12 months of age whose fathers were clergymen was 16.1 per 1,000 births, while the infants of sandwichmen and bill distributors died at the rate of 166. Nor is the reason far to seek. The former have the advantage of

well-ventilated rooms and clean, wholesome food, and generally spend their childhood under efficient supervision and sanitary surroundings. The latter, fed on unclean and unsuitable food, housed under conditions of poverty and overcrowding, are left to play about in yards and passages, exposed to all the dangers of defective sanitation.

A relation has been stated to exist between moderately small families and a low infantile mortality, and it is probable that any connection between a high birth-rate and a high rate of infant death arises from the fact that large families are common among the working classes, and that these classes are particularly exposed to influences unfavourably affecting infant and child life. Large families frequently tend towards some degree of poverty, forbidding removal into a house sufficiently roomy for proper accommodation. Domestic overcrowding therefore follows, with its innumerable evils.

Domestic overcrowding is responsible for a large proportion of the minor ailments affecting childhood. Children are anæmic, ill-nourished, and puny because they have

insufficient room in which to live, impure air to breathe, and unclean, unsuitable, and improper food to eat.

Undoubtedly, the outstanding cause of death and disease among children is defective sanitation, either in the house or in its immediate surroundings. The injurious effect of insufficient accommodation for washing and of the absence of proper storage for food is not likely to be denied. Unpaved yards, middens, pail closets and uncovered ashpits are effective weapons with which to destroy young life. The results of insanitation can be seen in an excessive death-rate from diarrhœal diseases and in the prevalence of other preventable illnesses of childhood. A high death-rate implies a high rate of damage among survivors. For every infant that succumbs there are many who just manage to survive, and are left as battered wrecks on the ocean of life. The permanent crippling effect of disease is as yet imperfectly appreciated.

It is fair to assume that parental ignorance and poverty are closely related to the prevalence of sickness and death in child-

hood. Want of knowledge on the part of parents is mainly responsible for two sources of risk to child life, namely, artificial feeding and food contamination.

It is true that artificial feeding is common among the children of the upper and middle classes—sections of the community with a relatively low rate of death. On the other hand, an increasing prevalence of breast-feeding among working-class mothers is coincident with a diminution in infant mortality. The child of a professional man, born into a favourable environment, possessing every advantage afforded by nursing and medical skill, can be placed on a carefully selected artificial food, prepared under hygienic conditions, without risk to health or physical development. The infant of an unskilled labourer, compelled to live in insanitary surroundings, handicapped by the disadvantages of impure air and soil, finds the mother's milk a safeguard against the dangers of polluted and suitable food. To such a child, artificial food, unless municipal enterprise intervenes, may be cow's milk of an inferior quality, grossly contaminated before

delivery in the home ; or some indigestible substance improperly prepared in a dirty utensil, and exposed to dust and flies.

Lack of facilities for the immediate treatment of small childish ailments, too often neglected owing to their apparent triviality, and the absence of skilled nursing during serious illness, are answerable for much easily preventable suffering and physical damage during the early years of life. The serious after-effects of diseases such as measles and whooping-cough, and the deformities arising from acute poliomyelitis (infant paralysis) and tuberculosis, could be largely prevented were adequate nursing assistance available for the community.

The health of the school child, it must be repeated, depends very largely on the health of the parents and the environment during babyhood. Much of the disease and defect calling for treatment during school age has a beginning in the first years of life, and could be prevented by appropriate Public Health measures. Further facilities for the education of the prospective mother, the establishment of maternity

centres, the provision of an adequate number of trained nurses as health visitors on the staff of each Medical Officer of Health, and sufficient hospital accommodation, are urgently needed in almost every locality. Under the Ministry of Health it is to be hoped that both central and local administration will be reorganised, so that the prevention and treatment of disease may be carried out by one Service under one control and that vested interests will no longer be permitted to obstruct the removal of conditions injurious to life.

CHAPTER I

Malnutrition

In the first five chapters of this book we shall consider the case of the physically defective child —the child who is the victim of malnutrition, or who has defects of teeth, of vision, of hearing, or of speech, or who suffers from heart or lung disease or from minor ailments. Of these physical defects, brought to light by systematic medical inspection in schools, malnutrition is probably the most important, both to the nation and to the individual child. Its widespread prevalence, the obscurity of its origin, and the insidiousness of its onset combine to make it a problem that cannot be ignored.

Nutrition is a comprehensive term embracing a complex condition. It may be regarded as one of the most reliable signs of a healthy body, the various systems of which are properly carrying out their physiological functions. In estimating the state of nutrition, there is to be taken into account the relationship between the height and weight of the child, its general demeanour, the

texture of the muscles, and the appearance of the skin. Alert carriage, firm muscles with a covering of fat, and a healthy elastic skin are evidence of good nourishment.

As there are yet no definite and reliable standards by which these various factors can be measured and no index that is generally applicable, the classification of the state of nutrition of a child will largely depend on the personal experience of the observer. It is not surprising, therefore, to find wide variations in the results of the examinations carried out by different School Medical Officers. In some areas a considerable departure from the average may be expected, owing to conditions peculiar to the locality, such as the prevalence of child labour or bad housing.

But when allowance is made for the difficulties encountered in arriving at a decision in any particular case, and for the influence of local conditions, there remains the fact that about a tenth of the child population attending the public elementary schools of the country is suffering from malnutrition, and that less than a half is well nourished.

In considering the national and industrial aspects of the serious position revealed by the systematic medical inspections carried out since 1908, it may be suggested that a successful stock-breeder would view with dismay the discovery that

less than half his young cattle were thriving and in good condition—in other words, well nourished. He would at once seek the cause, and, having found it, would bring about its removal and prevent a recurrence.

Possibly he might find that the malnutrition was due to in-breeding, or to inherited disease or defect. It is more likely, however, that the feeding would prove to be at fault, the sheds insanitary or overcrowded, and the animals neglected. The stock might be recovering from the effects of some disease, or want of cleanliness might account for the failure to thrive.

A healthy herd cannot be reared from ill-nourished young, nor can a vigorous race be expected from a school population in which a million children are suffering from malnutrition.

In so far as this condition leads to physical unfitness and in many cases to definite disease, it imposes a tax on the community and reduces the earning power of the nation.

The ill-nourished child is prone to minor ailments, susceptible to tuberculosis, listless, apathetic, incapable of sustained mental effort.

The causes of malnutrition are as yet imperfectly understood. It is certain, however, that among the more important are the following :—

1. **Insufficient or unsuitable food.** — The rapidity with which ill-nourished children improve

A class-room canteen.

PLATE II.

when in attendance at school canteens or after admission into institutions supports the assumption that either improper feeding or lack of food is a potent factor in the causation of malnutrition. While it is true that poverty may sometimes be the reason, it is much more usual to find that want of knowledge on the part of mothers of the value of the various foods, and inability to obtain by simple cooking the full nutriment from foodstuff, are chiefly responsible.

The reports of School Medical Officers clearly show an appalling amount of ignorance in simple home cooking and in the general management of the house, but it must not be thought that mothers refuse to learn when an opportunity is offered. The success achieved by schools for mothers points the way along which future effort must be made.

2. **Insanitary conditions in the home.** (*a*) *Lack of air and sunlight.*—The good results apparent in the health of children in attendance at open-air schools seem to furnish evidence that lack of air leads to ill-nourishment.

Unless sunlight can enter every living-room at some period of the day, dirt and dust are likely to be allowed to accumulate. The destructive effect of the rays of the sun on germ life is an additional reason for the ample natural lighting of rooms.

Staircases, passages and cupboards which are dark and ill-ventilated are difficult to keep clean

and dry. Dark recesses are often used as receptacles for various forms of refuse. Although considerable controversy has centred round the question of the effect of back-to-back houses on the health of the inhabitants, there can be no doubt that it is a method of construction which should unreservedly be condemned. In some districts householders are still permitted to erect without restriction buildings in back yards. The effect of this is further to reduce the already insufficient yard area, and to shut off a considerable amount of light and air. Even at the present day insufficient use is made of the windows and other means of ventilation provided.

Unfortunately, in many industrial areas the open window brings dirt and dust and a soot-laden air.

(*b*) *Overcrowding*.—On every side there is an appalling dearth of houses. The supply of new houses before the War was not nearly equal to the demand. Since 1914 building has been almost suspended and repair of property has been neglected, with the consequence that overcrowding is rampant in most industrial areas and in many rural districts. One estimate has put the need at a million new houses. Accepting this, it follows that some four to five million persons are living under conditions of overcrowding. Obviously the health of the child is likely to be injured by the unfavourable mental, moral and physical surround-

ings associated with the overcrowding of persons in a room, particularly when that room is used for sleeping purposes. The vitiation of the atmosphere, the difficulty experienced in washing and cleaning, and the liability to contamination of food through lack of a suitable place of storage diminish vitality and retard nutrition.

(*c*) *Closet and refuse accommodation.*—The offensive, insanitary privy midden and that equally disgusting modification of it, the pail closet, have a baneful effect on nutrition. These relics of the Middle Ages are detrimental to decency, they cause noxious effluvia, they encourage the presence of swarms of flies, and they lead to the fouling of yards and passages. Although it is not easy to demonstrate the exact part played by the substitution of water carriage for the conservancy system in reducing infant mortality, since other important sanitary improvements are usually associated with it, such as the paving of back yards and the provision of suitable dustbins, yet its value to health is beyond question. In one district the infant death-rate in houses with the water carriage was 117; in those with pail closets or privy middens, 250. It has been estimated that, other things being equal, by converting privy middens to water-closets a reduction in the infant death-rate of more than one-half may be expected. A high rate of infant mortality, as we have seen, is always asso-

ciated with a large amount of sickness and ill-health among the survivors.

(*d*) *The storage of house refuse.*—Intimately related with the disposal of fæcal matter is the storage of domestic refuse. Large, uncovered ash-pits, emptied at infrequent intervals, or wooden receptacles deposited in brick ashplaces, are dangerous and totally unsuitable. The accumulation, consisting of ashes and a mass of highly objectionable filth readily liable to decompose, forms a serious menace to health and decent living.

(*e*) *The yard and the street.*—Much of the ill-health and consequent malnutrition of children during the summer and early autumn arises from the consumption of contaminated food. Outside school hours the yard and the street are the only playgrounds available to many of the children attending the public elementary schools. An unpaved or defectively paved surface with broken gullies and leaking channels allows waste and slop water to soak into the soil. In wet weather pools of water collecting in the yard are converted into puddles, into which garbage and other débris are thrown. Children playing in surroundings such as these soon become fouled with the dirt, which is carried into the house. In warm weather flies are attracted to the pools and the rotting material; direct contamination of food in adjacent premises soon follows.

In yards common to several houses similar conditions will be found. A further disadvantage is that a yard which is shared by several houses is rarely kept clean. The influence of an undesirable tenant in one of the houses extends to the other members of the small community. The occupants of the other houses not unnaturally become disheartened on seeing their own efforts at cleanliness frustrated by a slovenly neighbour.

Infectious and contagious diseases are more easily spread where there are ample opportunities for frequent contact in an open yard. With a common yard, too, is frequently found a common water supply. In districts where the sub-letting of houses is prevalent and the only water supply a tap on the ground floor, the use of clean water will be reduced to a minimum.

Much of what has already been said with regard to unpaved yards applies with equal force to unpaved passages. Unless efficient sweeping is carried out daily these passages are little less than a refuse tip for the adjoining houses.

No less important is the state of the paving and cleansing of streets. It would often seem that the health aspect of this question had been entirely overlooked. Dirty streets are the precursors of disease, and children are the first to fall victims to it. Horse-manure and other refuse trodden underfoot in wet weather is splashed over pedestrians

and over food displayed in shop windows. During dry seasons a cloud of dust, mainly composed of finely powdered manure and human expectoration, is blown over fruit and other foodstuffs and into the houses. In towns where considerable attention has been paid to the paving and tar dressing of roads, it has been noted that dirt-borne diseases, such as impetigo in children, are rarely seen.*

3. **Want of sleep.**—The investigations carried out by school nurses show that malnutrition can often be traced to insufficient sleep. Few children obtain the rest that a growing animal requires.

Where sleeping accommodation is restricted and children share a bed with their parents the health of the child is certain to suffer.

In institutions it is found that children will sleep for twelve hours, even though they may not appear tired when going to bed.

4. **Disease.** — Malnutrition can at times be traced to definite disease or defect. Some ill-nourished children are suffering from tuberculosis, while others are in a condition particularly susceptible to infection—the pre-tubercular state. Measles and whooping-cough, among the acute diseases of childhood, often sow the seeds of long

* For a fuller consideration of insanitary conditions in and around the home, *see* "Housing and the Public Health," by John Robertson, C.M.G., O.B.E., B.Sc., M.D. 1919. (English Public Health Series.)

periods of ill-health. From diphtheria recovery is slow, and the tone of the muscles is generally late in reappearing.

The importance of measles alone as a cause of malnutrition must be considerable, since nearly half the children entering school have suffered from the disease, and of the remainder about 50 per cent. contract it during school life.

Enlarged tonsils and adenoids are usually associated with subnormal nutrition; so also are many of the minor ailments—sore eyes, recurring impetigo, and discharging ears. Reference has already been made to the widespread effects of the consumption of contaminated food and the consequent malnutrition.

To understand the magnitude of the danger to health arising from food-poisoning, it must be realised that in insanitary areas almost every home experiences an annual outbreak of summer diarrhœa.

Few diseases so sap vitality and so rapidly undermine nutrition as this form of diarrhœa. Within the space of hours a healthy, robust child may be brought to the verge of death, and for several weeks may remain pallid, listless and flabby, with hardly a trace of the previous well-nourished condition.

Apart from sudden attacks of enteritis, food-poisoning is undoubtedly at the root of much of

the sickness and malaise so common among children, and particularly among those attending the infant departments.

Rheumatism, either in its acute form as rheumatic fever, or in its sub-acute manifestations, is certainly a factor to be considered when inquiring into the possible causes of malnutrition. Recurring attacks of sore throat, "growing pains," bouts of raised temperature associated with headache, fleeting pains in the joints, transient rashes at times accompanied by painful rheumatic nodules, may be signs of the infection. St. Vitus's dance, or chorea, is probably in origin closely related to rheumatism.

The ill-effects of decayed teeth and oral sepsis are now becoming more widely known. Than dental caries, probably, no disease is more easily preventable, more amenable to treatment, or, when left untreated, more liable to increase. It leads to ill-health and malnutrition in several ways. Thus it may cause a spreading infection of the gums and teeth sockets, extending to the jaw. Enlargement of the lymphatic glands lying below the jaw, and at times abscess formation follow. The toxins produced by the disease germs are absorbed into the blood, and a poisoning of the body ensues. Purulent matter oozing into the mouth is continually being swallowed, with the result that the child shows signs of gastro-intestinal disturbance.

Anæmia, indigestion, joint-pains, headache, and a disinclination for exertion are further evidence of damage to the system, due to an apparently trivial defect in the mouth.

Bronchitis is relatively common in children, especially among those entering school, and, as a rule, those suffering from bronchitis are ill-nourished. The disease is probably due to a mild infection of the respiratory passages, the downward extension of a septic condition of the mouth, nose, or throat. Unhealthy homes, and particularly dark, ill-ventilated bedrooms aggravate the complaint, and parental ignorance often allows a vicious circle to be established. Owing to recurring attacks of bronchitis the child is kept heavily clothed, expansion of the chest and free movement of the limbs are restricted. The skin, always moist, becomes susceptible to changes of temperature. Fresh air is avoided lest the child should take further cold.

5. **Unsuitable employment.**—In a well-nourished child there is an accurate balance between absorption and excretion, between the energy obtained from food and the work performed by the body. Broadly speaking, the greater the amount of exercise the more food must be provided for the muscles.

Overwork, combined with insufficient sleep, rapidly leads to malnutrition, and is one of the

main causes of ill-nourishment in children approaching the age for leaving school.

School Medical Officers are unanimous in the opinion that the employment of children is detrimental to health. The children are tired when they reach school. Bodily and mental slackness characterises their work.

How to prevent malnutrition.— Prevention of ill-nourishment lies in two directions—the home and the school. The reports of School Medical Officers indicate that about 12 per cent. of children entering school are below normal nutrition. Clearly, therefore, prevention to be successful must begin before school age.

Education of the mother.—The teaching may be immediate or remote. The former consists of advice and instruction given at schools for mothers and maternity centres. The teaching must be simple, practical and interesting. It must embrace the preparation of nutritious, appetising dishes from ordinary articles of food, the dangers and prevention of the common infectious diseases, the cutting-out and making of children's garments, and general home management. Much good is likely to accrue from the home visits of capable trained nurses on the staff of the Medical Officer.

It is possible by home visiting to gain the confidence of mothers to a degree rarely otherwise attained and to make the visit the occasion of

tactful inquiry into the home circumstances, the health of all the members of the family, and the general sanitary condition of the house.

Remote teaching is that given to the elder girls in the public elementary schools, and to those who have left school but are in attendance at continuation schools or the evening classes of the technical schools. The value of the instruction may be somewhat diminished by the interval that naturally will elapse before the girls become mothers, a difficulty likely to be surmounted by the raising of the age for leaving school and by the institution of continuation schools; yet there is abundant proof that the teaching of mothercraft to senior girls is extremely important—and sadly neglected.

It is essential that the instruction should be by a fully-trained, experienced nurse, and that the girls should have ample opportunities for practical work—the washing and dressing of a baby, the preparation of the cot, and infant feeding.

There is much to be said for the suggestion that the girls should attend a maternity centre or school for mothers. There the facilities for practical demonstration exist, and the nurses in attendance are available as teachers.

The healthy home.—The health of the nation demands that every individual should have a home which is sanitary and is structurally adapted for a reasonable standard of cleanliness and comfort.

The School Child

In most industrial areas and in many rural districts the housing conditions, as we have seen, are a cause of illness and death in the child population. Until the insanitary areas are swept away and the dispossessed inhabitants decently re-housed, malnutrition will be prevalent in public elementary schools.

Every house should have as a minimum—

A water supply within the house, a sink, a wash boiler and a bath.
The means for adequate ventilation and light in every room.
Fly-proof storage for food.
A fly-proof receptacle for house refuse.
A water-closet.
A back yard completely paved.

The occupants must be taught how to make the best use of the means of cleanliness and ventilation provided, the dangers of dirt, the steps to be taken when illness occurs, and the agencies from which medical and nursing assistance may be obtained in time of need.

The local sanitary authority—the Town Council, the Urban or Rural District Council—must see that the surroundings of the houses are kept in wholesome condition. House refuse should be removed at least twice a week for destruction by fire. Streets and passages should be thoroughly

cleansed every night, and a liberal amount of water should be used for the purpose.

The beneficial effect of a thorough cleansing with water can be seen during a wet summer in the reduction of the death-rate from diarrhœa.

Institutional treatment and a home-nursing service.—The prevention of malnutrition due to definite disease obviously lies in an attempt to check the occurrence of the disease and in adequate and early medical attendance for the sufferers. Much depends on efficient Public Health administration—a pure soft-water supply, clean milk from herds free from tuberculosis, prompt measures on the outbreak of infectious disease, and regular sanitary inspection of the area. In two directions, however, local authorities have it in their power to strike directly at the root of malnutrition due to disease. They can provide institutional treatment, and they can establish and maintain a home-nursing service.

There is in most districts hospital accommodation for scarlet fever, diphtheria and typhoid fever. In the larger centres of population there are general hospitals to which acute non-infectious diseases and accidents are admitted. But, broadly speaking, there is practically nowhere adequate hospital accommodation for those serious ailments of childhood which are directly responsible for much of the malnutrition found in elementary schools.

Measles, whooping-cough, pneumonia, bronchitis, summer diarrhœa, tuberculosis, acute rheumatism and chorea, potent factors in the production of malnutrition, cannot as a rule be treated satisfactorily in the homes of the working classes. It is rare that a bedroom can be set apart for the patient, and frequently it is impossible to provide a separate bed. The mother, tired out by her household duties, can scarcely keep awake during the night. She has little or no knowledge of those details of home nursing on which the safety of the sufferer may depend. The occurrence of fatal complications in measles can often be prevented by regular cleansing of the lips, teeth and tongue—the toilet of the mouth, so important in typhoid fever.

Not only during the acute stages of disease is hospital treatment required. The surroundings of many houses are such that convalescence is prolonged and complete recovery rarely obtained. Fresh air, sunshine, suitable food, regular periods of rest and sleep, necessary in any disease, are especially so in ailments such as whooping-cough and measles, and in pneumonia and other dangerous infections. These essentials can be best provided in a convalescent home.

Until such time, however, as adequate institutional accommodation becomes available, most cases of serious illness must be nursed at home. Fully-trained nurses on the staff of the Medical

Officer of Health should, under supervision, attend cases of bronchitis, pneumonia, measles, whooping-cough, ophthalmia and many other diseases. The visits must be paid as often as the condition of the patient demands, and as a rule not less than twice daily.

Too long have children struggled unaided against the ravages of illnesses such as broncho-pneumonia. Worn to a shadow by long periods of confinement in an airless room, with parched lips crusted and cracked, with bodies bathed in perspiration under a heap of bed-clothing, it is surprising that any of the little patients recover. The result in most instances depends on efficient nursing. Each visit can be made the opportunity for giving simple instructions in the feeding and general management of the patient and in checking the spread of the disease. It should be possible for the nurses to obtain, as required, the loan of bedding, dressings, feeding-cup and other utensils. Fortunately, local authorities are empowered to supply as well home helps to assist in the housework, to mind the children, and generally to relieve the overburdened mother.

Combating malnutrition in the school.—In almost every instance the first step in the treatment of malnutrition should be to provide free meals at the school canteen. The next, to discover and attempt to remove the cause of the condition;

this will generally entail a visit to the home, and advice to the parents with regard to feeding, rest and sleep. Any disease or defect found on medical inspection must receive attention from an appropriate source.

Education at an open-air school is one of the best methods of restoring health to the children who are ill-nourished.

CHAPTER II

Dental Diseases

UNDER this heading will be considered dental caries—a spreading infection of the tooth leading to its complete destruction; pyorrhœa alveolaris—a chronic infection of the gums and the tissues around the teeth; irregularity and overcrowding of the teeth.

Dental decay.—Important in itself, on account of discomfort and difficulty in eating and loss of grinding surface, this is a source of danger to health mainly through the septic condition of the mouth usually associated with caries of the teeth. Poisons are formed and taken into the system both from the site of decay and from the decomposing food which collects around the painful tooth.

Pyorrhœa may be present apart from any dental decay. It is an extremely serious affection, obscure in origin, insidious in progress, not easy to detect in the early stages, and as a rule difficult to cure. Although many years have passed since the relationship between pyorrhœa and pernicious anæmia was first pointed out, the significance of

the disease as a cause of ill-health is only now beginning to be recognised.

Overcrowding of the teeth prevents thorough cleansing, and leads to the accumulation of food and tartar. The former rapidly undergoes decomposition, and the latter, spreading downwards, drives a wedge between the gum and the tooth, and opens up a way for infection. Pockets in which purulent matter collects are formed in the gums, and the pus overflows in the mouth. Secondary infection of the jaw and of the lymphatic glands in the neck may occur, but the chief injury to health is done by the circulation in the body of toxins absorbed from the teeth and gums. Anæmia, skin diseases, affections of the eye, and malnutrition follow in the train of oral sepsis.

The systematic medical inspection of children has shown that decay of the teeth is terribly prevalent, and that in many instances the mischief has obtained a firm hold by the time that the child first enters school. It has already been mentioned that about 80 per cent. of all children attending school require dental treatment, and in at least 25 per cent. of those entering school the teeth are to some extent already unsound.

Various investigations which have been carried out seem to show that urban and rural children are almost equally affected, and that artificial feeding in infancy has but little influence on the prevalence

of the disease. On the other hand, it is clear that the social condition of the children is an important factor; decayed teeth are less common among those coming from the homes of the poor, where probably a coarser diet is given.

When left untreated, the infection spreads until in early adult life not one sound tooth may be found. It is obvious, then, that prevention must be begun at an early stage, and be continued throughout life.

Overcrowding and irregularity of teeth to an extent needing attention are found in about 5 per cent. of children, and usually require a considerable expenditure of thought and time in treatment.

Many reasons have been suggested to account for the prevalence of dental diseases.

There is evidence to show that caries was uncommon in the early history of man; presumably, therefore, the cause lies among those factors making up civilisation. Lack of exercise of the jaws in early life, rickets, the infectious disorders of childhood, the excessive use of certain drugs, and probably inherited defects in the structure of the teeth may all be regarded as predisposing causes of dental decay.

The immediate cause, however, is the destruction of the enamel, the outer covering of the tooth, by acids formed by micro-organisms in the decomposing fragments of food lying in the crevices of

the teeth. The soft, starchy substances, such as biscuits and cake, are particularly liable to cling to the teeth and undergo fermentation, whereas coarse fibrous material, meat, fish, and vegetables act as cleansers, and stimulate the flow of the saliva. Mouth-breathing also undoubtedly encourages the onset and progress of oral sepsis.

Overcrowding and irregularity appear to be primarily due to insufficient development of the jaws, so that there is not enough space for the regular alignment of the teeth. The growth of the bones of the jaw may be retarded by want of masticatory exercise in early life, or there may be structural defects of the palate associated with adenoids.

How dental disease may be prevented.—One of the first steps in any preventive scheme must be an attempt to bring home to the parents the seriousness of the condition, the advantages of suitable diet, the value of the toothbrush, and the importance of early dental treatment.

The interest of the mothers may be awakened by short illustrated addresses at maternity centres and schools for mothers, by the advice given by health visitors and school nurses during home visits to follow up dental defects or for any other purpose. A school dentist can often arrange to speak for a few minutes to the parents attending the school at the time of the routine dental inspec-

tion, and to those bringing children to the school clinic for treatment.

Education of the child may begin at an early age. In the nursery school, children two or three years old can be accustomed to the daily use of a toothbrush, and by the time of entry to an elementary school many a child can with supervision clean the teeth.

Toothbrush drill, with a separate labelled equipment of brush, powder and mug for each child, should form part of the daily instruction in every school.

The teaching of the hygiene of the mouth should be given at frequent intervals in every class, in terms appropriate to the age of the children, and should include toothbrush drill in dumb show.

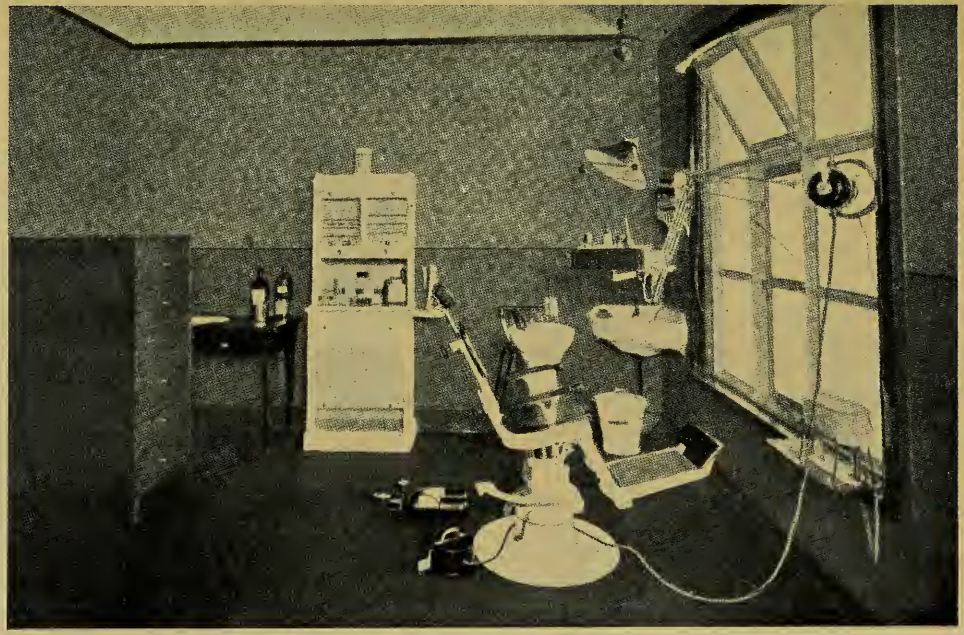
Dental inspection and treatment.—The experience of the last nine years has proved conclusively that every local authority should put into operation a complete scheme for dental inspection and treatment by whole-time dental surgeons, assisted by trained nurses. It is generally estimated that one whole-time dentist can examine and treat about 2,500 children in a year. Treatment must largely be conservative, directed to the saving of teeth rather than to extraction.

Treatment should be started concurrently with the onset of decay, and should, therefore, begin

at the nursery schools and child welfare centres, and be continued on entering school.

Dental clinics, which have now been established by more than 150 Education Authorities, might reasonably form the nucleus of a comprehensive scheme for dealing with all children and young persons up to the age of 18 years.

In the majority of areas the dental staff appointed has not been sufficient to cope with the amount of disease, and it has therefore only been possible to inspect and treat children of certain age-groups, usually those in whom the permanent teeth were beginning to appear. Neither success nor economy can be expected from a scheme which is partial or badly organised; much of the expenditure on conservative dentistry is likely to be wasted unless subsequently there are regular and frequent re-inspections. The entrants to school should receive prompt treatment, and should be examined again at least once every year during school life.



Dentist's room of a school clinic.

PLATE III.

CHAPTER III

Defects of Vision, Hearing and Speech

Defects of Sight

Defects of vision are a serious handicap to the child. Blindness is an intolerable burden to the individual and a heavy loss to the community.

The teaching in elementary schools is largely visual, and for its reception there must be acuity of sight sufficient to follow without strain the writing on a blackboard and to read without difficulty well-printed books. With imperfect vision uncorrected a child cannot keep pace with its fellows. Although individual instruction and a favourable position near the blackboard may mitigate some of the disadvantages of short sight, other common defects of vision cannot be met in a similar manner. With the expenditure of great physical and mental effort an intelligent child may overcome a few of the obstacles to education caused by errors of refraction, but the task imposed on the eyes and nervous system will soon be seen in sore eyelids, peering vision, headache, squint and other symptoms of eyestrain.

The more important diseases and defects of the eyes from which children may suffer are sore lids, inflammation of the inner surface of the eyelids and ulcers of the cornea, inflammation of the iris or of the lining membrane of the eyeball, and defects of refraction—short and long sight. On an average, it may be said that of all children needing treatment for the eyes, about 80 per cent. suffer from defects of vision and 20 per cent. from actual disease of the eye.

The minor diseases of the eye—sore lids and the like—when not due to defects of vision, can often be traced to unfavourable home conditions. Dark, ill-ventilated rooms, overcrowding, infectious diseases, the very factors causing malnutrition, are at the root of many affections of the eye.

Therefore, prevention must in the first place be directed to the removal of those dangers to eye and health embraced in the word insanitation—the demolition of unhealthy areas, the regular and thorough cleansing of streets and passages, the abolition of the conservancy system; in short, complete and efficient Public Health administration.

The more serious diseases, such as ulcers of the cornea and iritis, may result from neglect or mismanagement of an apparently trivial sore eye, or may follow measles, rheumatic fever, tuberculosis or congenital venereal disease. Partial or

total blindness dating from infancy is almost always due to purulent ophthalmia of the new-born —ophthalmia neonatorum.

Many reasons have been given for the prevalence of defective vision. In short sight the eyeball is elongated. In some cases this condition may be inherited; in other instances work which entails stooping and congestion of the eyes seems to be the cause. The long eyeball is mainly a product of civilisation.

In long sight the eyeball is slow in growth, and remains permanently too short; no satisfactory explanation is yet forthcoming to account for this failure of development.

In astigmatism, the trouble is due to irregularity of the surface of the cornea, and as a rule it is found along with either an elongated or a shortened eye.

Squint is a danger signal generally betokening failing sight in the squinting eye. It usually appears before school age, and unless prompt measures are taken the affected eye may become useless.

To prevent corneal ulcers, arrangements should be made for the prompt and efficient treatment of the minor diseases of the eye, and the daily inspection by a nurse of all children attending school. Diseases in their early stages can then be referred at once to a member of the school medical staff—

an ulcer rarely appears without the warning of a preliminary inflammation.

While the influence of heredity as a cause of defective vision cannot be determined, it is apparent from the reports of School Medical Officers that measures to eliminate eyestrain are among the first steps that must be taken if the prevalence of defective eyesight is to be reduced. Attention must therefore be directed to the adequate lighting of class-rooms, the use of suitable blackboards, books and desks, and the restriction of near work in the case of young children. The intimate relationship which exists between ill-health and defective vision points to the need of convalescent treatment after the more common infectious diseases of childhood, and to the urgent problem of malnutrition.

Treatment.— Treatment of minor ailments of the eye can be carried out at a school clinic by a nurse acting under medical direction. With regular daily attendances extremely satisfactory results are likely to be obtained. Children suffering from corneal ulcers and serious affections of the eye should be seen by an ophthalmic surgeon or admitted into an institution.

Errors of refraction should be referred to an ophthalmic surgeon for correction by spectacles, and each case should again be examined by the specialist after the glasses have been provided.

There are, however, two difficulties likely to be experienced after the treatment has been carried out. In the first place, the child may not wear the spectacles; secondly, they may presently be damaged or broken. The remedy lies in efficient supervision both in the school and at home. The daily visits to each class by a nurse will usually lead to regular use of the spectacles in school. As soon as the glasses are broken the child can be sent to the clinic. After treatment, every case of defective vision should be seen again by the surgeon immediately signs of eyestrain appear, and under any circumstances within a year.

In the majority of instances the errors of refraction will be so far corrected that the child can compete with its neighbour on equal terms; but there will be a few children for whom the need of special facilities will arise.

In urban districts it is generally possible to organise a special class in a conveniently situated school, and to place the children under the charge of a teacher trained in methods of oral instruction, thereby lessening the visual strain which attendance at an ordinary elementary school imposes. To such a class may be sent children suffering from squint, to undergo a course of exercise essential for restoring the functions of the failing eye. There is a further advantage, that by gathering together children whose vision is seriously

impaired it is more easy to arrange for frequent examinations by an ophthalmic surgeon and for operative treatment as necessity demands.

A child unable through defect of vision to benefit by the instruction usually given at a public elementary school becomes eligible for admission to an institution for the blind. These residential schools give an intelligent child the opportunity of reading, writing, dancing, singing, and of becoming proficient at a trade, so that as young adults the scholars may be self-reliant and self-supporting members of the community. Further accommodation is urgently needed for the blind, and much more might be attempted in the way of extending the scope of teaching in manual work. Gardening, poultry-keeping, and some kinds of dairy and farm work are useful occupations for enlarging wege-earning capacity, and are less monotonous than chair-caning, basket- and mat-making.

Diseases of the Ear and Defects of Hearing

Waves of sound striking upon the drum of the ear are conducted by a chain of small bones across the chamber of the middle ear to the membranous wall of the internal ear, from which impulses pass to the brain. The middle ear is connected with the throat by a channel—the Eustachian tube—along which air can pass. Obstruction of this tube immo-

bilises the drum and interferes with the conduction of sound to the inner ear.

The throat is often the site of acute infection, and the inflammation is apt to spread up the Eustachian tube to the middle ear.

An abcess forming in this part of the ear generally bursts through the drum, and the condition known as ear discharge follows.

About 3 per cent. of the children attending public elementary schools suffer from some form of disease or defect of the ear.

Deafness is a serious handicap both during school life and in after-years. It deprives a child of most of the advantages to be derived from oral teaching, and even when present in a slight degree leads to dullness and inattention.

When the child leaves school, deafness bars the way to many employments, and unless special instruction is provided a deaf person may become a burden on the State.

The discharge often associated with disease of the middle ear renders a child a nuisance, and frequently a danger to other members of the class.

The **causes of deafness in children** are mainly two. The defect may be congenital — the infant is completely deaf from the time of birth, and as a consequence does not learn to speak—a deaf-mute. In the majority of instances, however, deafness is due to disease of the middle ear, gener-

ally set up by one of the acute infectious diseases of childhood or by continued obstruction of the Eustachian tubes.

Among the infectious diseases, measles, scarlet fever, diphtheria and colds in the head are chiefly important in this connection. Septic conditions of the mouth and mouth-breathing may be the origin of an acute tonsillitis and middle-ear disease.

Enlargement of the tonsils and adenoids brings about deafness by obstructing the passage of air along the Eustachian tubes to the middle ear. The fact that removal of enlarged tonsils often leads to the cessation of ear discharge seems to show that suppuration in the middle ear may be kept active by an unhealthy state of the throat.

Progressive deafness occurring in early adult life will, on investigation, frequently be found attributable to enlargement of the tonsils in childhood. Disease of the middle ear unaccompanied by ear discharge is apt to be overlooked unless a careful examination is carried out and the drum of the ear inspected in every case of deafness, however slight. Defect or disease of the nose, in that it leads to mouth-breathing, may give rise to deafness and general ill-health.

Prevention and Cure. — It should be widely known that deafness is to a large extent preventable.

A carefully organised campaign to diminish the prevalence of infectious diseases, particularly

measles and scarlet fever, prompt removal to hospital when the home circumstances are unfavourable, and the liberal provision of home nursing, all directly tend to reduction of middle-ear disease and the deafness it causes.

It is hardly possible to overestimate the importance of efficient nursing during the occurrence of illness generally, and especially in the infectious diseases. Thorough cleansing of the mouth, nose, and throat is so essential that in measles and pneumonia dangerous respiratory complications can often be avoided by mouth toilette alone.

A serious attempt should be made to bring home to parents the risks attending a cold in the head, an acute infectious disease transmitted from person to person by the act of coughing, sneezing, and the use in common of feeding utensils. The germs causing the disease generally first lodge in the throat and then spread up the back of the nose and along the Eustachian tube to the ear, so that sore throat, difficulty in breathing through the nose, and deafness are experienced. Later, hoarseness and bronchitis are signs that the disease has invaded the lungs.

Fortunately, there are means available whereby a cold in the head can be prevented or checked in the early stages. Oral and nasal hygiene should be part of the daily life of every person. Gargling the throat and washing out the nose are as useful

in keeping the body healthy as cleaning the teeth, and during the spring and autumn, when colds are common, should never be neglected. The infection can often be aborted in the beginning by the frequent douching of the nose.

Persons suffering from a cold should remain at home, and should, on coughing and sneezing, always hold a handkerchief before the face.

If it is necessary to mingle with the public, a mask should be worn. Knives, forks, spoons, and cups should be immersed in boiling water, since the experience of institutions shows that infection is readily spread by articles in common use.

The proper development of the nose is dependent on its regular use in breathing. Disease leads to accumulation of mucus and predisposes to infection.

Every child, on entry into school, should be medically examined; those found to be deaf should be referred for treatment by an aural specialist.

Slight deafness can, at times, be cured by pocket-handkerchief drill; in other cases removal of the tonsils and adenoids may be needed.

Middle-ear disease, with discharge, will frequently clear up under daily syringing by a nurse acting under medical supervision.

In a few instances an operation on the ear may be necessary.

Whatever treatment is adopted, regular per-

sistent following up is essential to observe the progress made and to watch for signs of relapse.

Education of the Deaf. — The need for special provision for the education of the deaf is urgent in proportion to the degree of deafness.

Children who are slightly affected, if allowed to sit in front of the class, may be taught in ordinary elementary schools. More advanced cases among those partially deaf can receive instruction in special classes, under the charge of teachers trained in the methods to be employed, while those completely deaf, including deaf-mutes, are suitable for admission to institutions.

Education of the deaf is directed chiefly towards the attainment of two objects—the cultivation and restoration of speech, and the acquirement of a trade. Without these the outlook of a deaf child is almost without hope. Promising results are shown by various schools for the deaf; on leaving, an intelligent child can usually obtain suitable employment, and a large proportion become highly skilled workmen.

Inquiry into the after-history of the patients generally supports the assertion that speech is retained and the aptitude for careful work persists.

Money spent in the education of the deaf is certainly a sound investment.

It would be cheaper, however, to prevent the occurrence of the diseases which lead to the defect.

Defects of Speech

Stammering is an important defect of speech found in about 1 per cent. of school children. Although the proportion of stammerers to those with normal speech is not large, yet the condition is a very real handicap to the individual, and likely to interefere with the career of the child in school and in after-life.

Apart from stammering, some defect in articulation is present in from 2 to 3 per cent. of children medically inspected. There is, however, no evidence to what extent defects of speech among those entering school develop into stammering in later years.

The stammerer is usually nervous, sensitive, self-conscious—peculiarities which aggravate the disturbance of speech. More common in boys than in girls, the defect is generally established before school age. For the causes, therefore, search must be made into the family history of the parents and the surroundings of early childhood. While it is possible that a tendency to stammer may be inherited, there is the important factor that a normal child learns to speak by tedious attempts at the imitation of sound, and may consequently acquire the defect by association with a parent similarly affected. The experience of the War has demon-

strated the internal origin of shell-shock, of which stammering is a frequent symptom, and a close connection with the repression of fear. It is thus more than likely that stammering is almost entirely due to a disordered mental condition. It remains true, nevertheless, that the children are often ill-nourished, anæmic, tired, and suffer from some marked physical defect—enlarged tonsils, adenoids, defective vision, deformity of the jaw or chest.

In the present uncertainty of the exact causes of stammering, **prevention** must largely aim at the treatment of the early defects of articulation by breathing and vocal exercises, reading aloud, and the cultivation of self-reliance.

During the past four or five years considerable progress has been made in the methods adopted to educate children who stammer, but only in a few areas has a well-organised and complete scheme been initiated. Broadly speaking, the measures to be taken in any district should follow four lines.

In the first place, the affected children must be discovered by systematic medical inspection of the entrants and other age-groups. Individual cases should be referred to the School Medical Officer by the school nurses and teachers. Every stammerer must be carefully examined to discover the extent of the defect and the possible presence of any other abnormality.

Secondly, the general health should be improved by ample food, fresh air and rest, and treatment provided for defects such as enlarged tonsils and adenoids.

Thirdly, special classes for stammerers should be established in the ordinary elementary schools, under the direction of a teacher qualified for the work. It is essential to attempt to secure one in whom the children will have confidence; whose efforts will be to implant or restore self-control in the patient. On the selection of the teacher depends the success of the class.

It is usual to limit the class to about twelve children, and to insist on a period of at least six weeks' attendance. There are, as a rule, two sessions daily, each of two hours' duration. Half of each session should be given up to special instruction — breathing and vocal exercises; the remainder to ordinary school work and manual work in the open air.

The results of the treatment are soon apparent. At the end of six weeks nearly all the children will have made remarkable progress, both in reading aloud and in speech. The improvement in speaking is frequently beyond belief.

Finally, on returning to the ordinary school, it is necessary that each child should be persistently followed up to supervise the home conditions and to watch for signs of a relapse. Even without

after-care, about half the cases will remain permanently cured.

In some localities revision classes are held so that every child, at any time in attendance at a special class, is assured of at least three weeks' tuition each year. Re-examination should be carried out by the School Medical Officer at intervals of about six months, and a record card kept in each instance.

It is probable that too little effort has been made to arouse the interest and seek the assistance of the parents. In some classes a preliminary period of fourteen days' complete silence is prescribed, but to secure this is almost impossible unless the parents enter heartily into the attempt which is being made to effect a cure, and later try to enforce at home the deliberate speech and peaceful surroundings which may make the recovery permanent.

CHAPTER IV

Heart and Lung Disease

Diseases of the Heart

The membranes lining the heart, and those covering its surface, are liable to acute inflammation, particularly during the early years of life. The detection of the disease at the time of its occurrence is by no means easy. On the one hand, the severity of the primary illness may obscure the symptoms; on the other hand, constitutional disturbance may be so mild that the onset of the disease passes unnoticed.

In either case, medical inspection during school age may first reveal the presence of damage to the heart. The inflammation may be most marked in the valves, and it is here that the permanent effect of the disease soon becomes apparent in the failure of the valves to close the various chambers of the heart. A prolonged period of complete rest in the early stages of the disease may check the progress of the inflammation, and prevent the thickening and destruction of the valve. It is extremely important, therefore, that the affection should be recognised in the beginning.

Diseases of the Heart

Definite signs of valvular disease of the heart are not common in school children. Only about 1 per cent. of those medically inspected show evidence of organic disease; but there is reason to think that the mischief is more frequent among the older children, and it should not be impossible to devise measures of school hygiene whereby the prevalence of the disease may be diminished.

Apart from organic diseases, functional disorders of the heart—irregular action and the like—are found in some 2 per cent. of school children, and are beginning to attract attention in view of the possibility that the more serious defect may follow.

The membranes of the heart may become infected during acute illnesses such as rheumatic fever, chorea, scarlet fever, and pneumonia. By far the most potent of them is rheumatic fever; but the frequency with which a history of past illness is lacking when organic disease is discovered supports the contention that for the beginnings of the disease search must be made among the apparently trivial ailments of childhood.

Recurring attacks of tonsillitis, "growing pains," with bouts of feverishness and headache, are tokens of subacute rheumatism, which is undoubtedly one of the most active agents in the production of endocarditis—inflammation of the lining of the heart. Mild and transient signs of

St. Vitus's dance, unsteadiness in grasping objects, slight twitching of the face and limbs call for an examination of the heart.

In a small proportion of the cases heart disease dates from birth, and is due to defects in development. In some instances the muscle of the heart may be at fault, the result, possibly, of diphtheria or other infection.

Functional disorders of the heart, such as irregularity, and palpitation under excitement, are probably often due to an inherited instability of the nervous mechanism, and are of little or no detriment to the future health of the child.

Very careful examination, at times, is needed to differentiate between the minor degrees of organic disease and functional abnormalities, and in some instances it is only after repeated examination that a decision can be made.

For the prevention of endocarditis there must be an attempt to diminish the prevalence of rheumatic fever.

Unfortunately, little is known concerning the cause of this disease. Exposure to damp, wearing wet clothes or thin footgear, are thought to predispose to infection; certainly the existence of an unhealthy condition of the nose and throat, and particularly enlarged tonsils, seems to be a factor of importance.

Early recognition of the occurrence of subacute

rheumatism is of great value, and to this end a nurse should daily visit each class in school, to observe the condition of those present, and to discover the reasons which lead to irregular attendance. The temperature of children suspected to be ailing should be taken, and a general supervision of minor maladies enforced. Every department should possess facilities for the drying of clothing, and generally a close watch should be kept over the ventilation and management of the cloak-room, which should be sufficiently large to allow of the hanging of each garment without overlapping. Every school should possess a supply of clothing and slippers for those who have to remove wet garments.

Enlarged tonsils, "growing pains," and chorea should receive adequate treatment, and in every case the home conditions should be the subject of investigation. The possibility of a damp, ill-ventilated bedroom should be borne in mind. The parents should be encouraged to pay attention to the importance of suitable clothing and footwear for the child, and to other details of personal hygiene.

Children with non-progressive organic disease of slight extent, or with functional disorders associated with some degree of ill-health, can generally attend an ordinary elementary school, or when practicable an open-air school.

Physical exercise may, as a rule, be permitted, due care being taken to watch for any appearance of heartstrain.

When the disease is of moderate extent, by far the best course is to provide institutional treatment in a residential school; in this way it is possible to arrange for rest in bed, graduated exercises, and constant medical supervision. The child can be taught a suitable trade which will not impose a strain on the heart.

In advanced cases, and those in which the damage is progressive, children left at home are liable to drift into the state of incurable invalids, never able to earn a wage or afford medical attention. For most of these the quiet, well-regulated life of an institution is required. Under skilled direction and comfortable surroundings they may take an interest in life, and even do a considerable amount of useful work.

Diseases of the Lung

Bronchitis, broncho-pneumonia, and tuberculosis are the three lung diseases most commonly found in children of school age; the first is by far the most prevalent, and possibly the most important.

Bronchitis. — Of children entering school,

about 5 per cent. suffer from bronchitis, the significance of which, as a cause of ill-health, has hardly yet begun to be appreciated. In England and Wales during 1917 some 8,000 deaths of children under 15 years of age were stated to be due to bronchitis, and it is reasonable to assume that permanent damage was done to many that recovered.

The relationship between malnutrition and bronchitis has already been pointed out, but beyond this, bronchitis unquestionably prepares the way for more serious lung diseases—bronchiectasis, broncho-pneumonia, and tuberculosis.

Bronchitis may be considered a chronic infection of the larger air-passages by micro-organisms of low virulence. In many instances the starting point is an unhealthy state of the mouth, nose, or throat, decayed teeth, adenoids, or enlarged tonsils. The acute infections of childhood, particularly measles and whooping-cough, are rightly blamed for the beginning of bronchitis; but in a large proportion of the cases there is in addition the influence of insanitary conditions of the house, lack of sunlight and of air, ill-ventilated bedrooms, overcrowding, and want of personal cleanliness.

Pulmonary tuberculosis. — The extent to which this disease occurs in children has been a matter of much controversy. Some consider it quite common, while others think it extremely rare.

The explanation of these diametrically opposite views may be found in the fact that children are liable to an infection of the lungs producing physical signs closely resembling those of tuberculosis, but due to germs other than the tubercle bacillus. This disease may be regarded as **chronic broncho-pneumonia**, sometimes beginning in an acute illness with feverishness and rapid respirations, while in other cases the onset is indefinite and unnoticed. The condition may persist for several months and eventually disappear, or the infection in the lungs may spread and bring about the death of the child.

Of the causes of this disease practically nothing is known; it is more common in the slum child than in one coming from a clean, well-managed home. More than one member of a family may be affected, and the disease may be found in those under school age.

Pulmonary tuberculosis is rare in children, and especially rare in those attending infant departments. In every district, however, adequate arrangements should be made to cope with the whole problem of tuberculosis.

Fortunately, there is now in most areas the machinery whereby ailing children can be referred to specialists; but facilities for treatment in sanatoria or open-air schools are totally insufficient.

To the cause of pulmonary tuberculosis it is

hardly necessary to refer. The invasion of the lung by the tubercle bacillus is usually aided by unhealthy home surroundings. A recent attack of measles or other illness may have reduced the resistance of the body. The *immediate* cause, as a rule, is intimate contact with a consumptive person.

Prevention.—The prevention of lung diseases will be found first in general measures directed towards improving the health of the child population. The closing of insanitary areas, the prevention and postponement of infectious diseases, adequate and prompt treatment of defects of the teeth, nose, and throat, hospital accommodation and home nursing for serious illnesses, light and airy schools and ample playgrounds—all these will lead to the reduction of respiratory disorders. An increasing knowledge of the value of cleanliness and fresh air and of the danger of neglecting minor ailments will do much to diminish the prevalence of such diseases, which now cause some 50,000 deaths each year.

Pulmonary tuberculosis is mainly spread by patients in an advanced stage of the disease, and for this reason it is essential that institutions sufficient to meet the demands of the locality should be available. The housing should be such that a careful consumptive can live at home without infecting other members of the family.

The treatment, in the first place, should be directed towards the amelioration of the home conditions, and advice should be given to the mother with regard to suitable food, clothing, and sleeping accommodation.

Next comes the provision of institutional treatment for the child. Every case of tuberculosis, chronic broncho-pneumonia, and the more persistent and marked instances of bronchitis require the diet, rest, and healthy living provided in a sanatorium or residential open-air school. Experience of the results there obtained affords convincing proof of the value of open-air life in diseases of the respiratory system.

Expenditure on convalescent homes, schools for recovery, and open-air schools is one of the most remunerative investments that a local authority can make. Pulmonary tuberculosis and other infections of the lung in children readily respond to treatment, and under favourable home circumstances do not, as a rule, recur, so that years of ill-health or often premature death can be averted by prompt attention in childhood.

In less serious instances of bronchitis children may attend open-air day schools, or open-air classes at an ordinary school.

Lastly, a child, once found to be suffering from these diseases should, in no circumstances, be lost sight of. Persistent and regular following up by

nurses is necessary to ensure that the routine of open-air life is not forgotten in the surroundings and example of the home.

Unless there is evidence that the child is so infectious as to be a danger to others, exclusion from the school should not be enforced.

CHAPTER V

Minor Ailments

UNDER this term will be considered numerous diseases generally regarded by parents as too trivial to be worth treatment. Like the sore eyelids, inflammation of the surface of the eye, conjunctivitis, ulcers of the cornea, and ear discharge, that have been reviewed in Chapter III., chilblains, cuts and sores, and contagious diseases such as impetigo, ringworm, itch, and pediculosis, far from being trivial, are of extreme importance to the health and comfort of a child.

Certain of these ailments may, as we have seen, be the beginnings of serious permanent damage to sight or hearing. In other instances there is grave risk that the disease may spread throughout the class or school. In every case the education of the child is likely to suffer, either through physical disability and discomfort, or by exclusion from school on account of contagious disease.

Ringworm.—Of this disease there are two types —that affecting the skin and that usually attacking the hairy scalp.

The former is generally of bovine origin, and is particularly easy to cure. The red rings of the fungus can be destroyed by two or three daily applications of iodine, and exclusion from school while treatment is taking place is unnecessary.

Ringworm of the scalp is a much more serious infection. It is almost always derived from a pre-existing human case, and a child under school age may be the source.

The prevalence of scalp ringworm varies greatly in different localities. In some districts nearly 5 per cent. of all school children may be infected, while in other areas there may be less than 1 per cent. Infants' departments provide by far the largest number of cases, for after the eighth year the hair begins to show increasing resistance to the parasite.

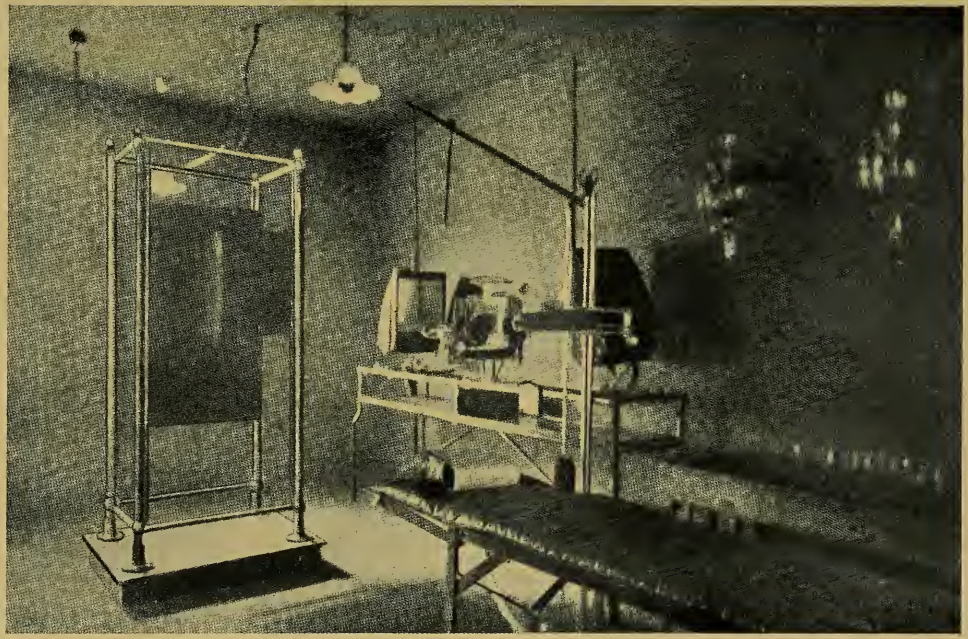
The disease usually takes the form of areas of scurf through which short stumps of brittle hairs protrude. Owing to the fact that the fungus penetrates the hair and passes down into the follicle, the infection is notoriously resistant to the application of antiseptics.

The prevention is more simple than the cure. Every child suffering from scalp ringworm is a focus of infection. Caps, towels, brushes, shawls, and the dust of class-rooms are the main channels by means of which the spores of the fungus are conveyed.

The head of every school child should be carefully examined at least once a month by a nurse instructed in the method to be adopted. On the discovery of an instance of the disease a very thorough inspection of each scalp in the school should be made every week for three months. A pocket lens should be used in the examination of suspected cases.

Children suffering from ringworm of the scalp must be excluded from school until a re-admission notice has been issued by the Medical Officer. A home visit should be made, particularly for the purpose of discovering disease in those under school age, and to arrange for disinfection.

Treatment may take the form of the application of various chemicals or the use of X-rays. In the former it is essential that the affected area should be shaved at least twice a week, and that no water should be applied to the scalp. The X-ray treatment, by causing the hair to fall out, frees the follicles from infection, and is doubtless the most rapid and most certain method to employ. Without the use of X-rays the disease may persist for several months or even years, and the loss of education will be a very serious matter for the child. To meet this, in urban areas the prevalence of ringworm may justify the establishment of a special class for those excluded from ordinary elementary schools. This procedure has the advantage that



X-ray room of a school clinic.

PLATE IV.

the children are being educated, and at the same time are under treatment and supervision.

Scabies.—Itch, like ringworm of the skin, is an ailment of which the treatment is comparatively simple, and can be carried out by a nurse acting under medical direction. It is, however, a disease causing considerable discomfort and, at times, intolerable itching. Scabies is due to the invasion of the skin by the itch parasite. The female burrows into the skin and there deposits eggs, while the male remains on the surface or in the clothing. The infection has become, owing to the War, much more prevalent than formerly, but even in pre-war times it was the cause of much loss of attendance, mainly because in few areas have systematic schemes been provided to deal with the problem.

The first step in prevention must be the detection of the disease, and the public elementary schools afford a convenient starting-point for inquiry. Every child in a school should be examined by a trained nurse at intervals of not more than a month. Children suspected to be suffering from itch should be referred to a member of the school medical staff. Those actually affected should be excluded and followed up to their homes in order that arrangements may be made for treatment. Careful inquiries should be conducted into the possibility of infection in other members of the family. Thorough disinfection of the clothing and bedding

must be carried out if a recurrence is to be avoided, and where in a house several persons are involved, disinfection may have to be repeated.

To obtain treatment the child can attend at a school clinic or other centre for baths and inunction, or can be admitted into hospital. Experience has shown it to be almost useless to expect that scabies will be cured in a reasonable time if the treatment is left to the parents. Without the systematic routine in operation at a school clinic or institution, it is common to find children uncured after many months' absence from school.

The details of the treatment are simple. On arrival at the centre the child is given a hot bath and an attempt is made to expose the burrows by vigorous lathering with a soft brush. After careful drying of the skin, sulphur ointment is rubbed all over the body and particularly on the areas most affected. While bathing has been taking place the clothing should have been disinfected, washed, and dried. This routine is repeated daily, and in most instances three applications are sufficient to effect a cure. On the first day of attendance, and again in three or four days, the bedding must be removed from the home for sterilisation by steam. The facilities of a laundry and disinfecting apparatus are most easily obtained by using premises at a hospital or similar institution as a centre.

The chief difficulty likely to be experienced is

the irregular attendance of the children. Persistent following up may obviate this to some extent, but in a proportion of the cases arrangements will have to be made for admission to a hospital, or for treatment in the home. The former is the most satisfactory method.

Infestation with vermin. — One of the most noticeable results achieved by school medical inspection has been a marked improvement in the state of cleanliness of the children. It is rare now, among those attending school, to find conditions such as were frequently discovered ten years ago. But further progress is needed. Even now about 15 per cent. of all children systematically examined have verminous heads, but as it is usual to acquaint parents with the time of the medical inspection of their children, the proportion of dirty heads among all children in school is probably considerably in excess of the figures mentioned.

Though dirt and disease are old associates, at the present day it should be hardly necessary to refer to the injurious effects on health of the presence of vermin.

Investigation carried out during the War has shown that trench fever, and possibly other illnesses which may become prevalent in England, are transmitted by lice. More than ever, therefore, is it necessary to keep in operation carefully planned schemes to stamp out uncleanliness.

The School Child

Every child in school should be examined by a nurse at least once a month. Those found to be verminous must be followed up in order that instruction and warning may be given to the mother and inquiry made into the sanitary condition of the house. It is common to find that in some of the cases re-infection comes from children under school age, young adults, and even from the parents.

Legislation is urgently needed to deal with verminous persons other than children.

The sanitary defects in the house should be remedied, and in some instances general cleansing of the premises and disinfection of bedding will be required. Each child found to be verminous should be re-examined in school within a week from the date of the first inspection, and unless the condition has been remedied a notice should be served on the parents, and the child treated at a cleansing centre.

School Medical Officers have clearly proved that success lies in the frequent survey of all children and in the removal of insanitation in the home, for it is notorious that in every school there are certain children, generally those from slum areas, who act as sources of infection.

The ideal, undoubtedly, is that every child should attend school clean and free from vermin; but until this is realised some attention must be given to the prevention of infection in schools.

The hair of boys should be kept short, and that of the girls should be tied in a coil at the back of the head, unless the parents prefer that it should be cut. Overcrowding in the class-rooms and the indiscriminate heaping together of clothing in cloak-rooms increase the opportunities for the transmission of lice.

The standard of cleanliness maintained in a school is largely in the hands of the teachers, who can do much good by example and by simple class teaching in the elements of personal hygiene.

Further facilities are urgently needed so that every child can wash before each school session, and have at least a weekly bath on the school premises.

The abolition of the common towel has too long been delayed. When two or three hundred children use the same towel for a week, the spread of various contagious diseases needs little further explanation.

Injuries.— Some injuries and accidents can well be included in the scope of the activities of a school clinic. Slight burns and scalds, foreign bodies in the eye, ear, or nose, bruises, abrasions, and the like, although rightly regarded as minor ailments, are often the beginnings of disease.

A successful campaign directed to the early detection and prompt treatment of minor ailments is largely dependent on the provision of an adequate staff of school nurses. In considering the question,

factors such as the social status of the children, the amount of travelling entailed in visiting the schools, and the character of the homes must have due weight; but, speaking generally, it may be said that for all health purposes the whole-time service of one nurse will be required for each thousand children under 14 years of age. There will, however, soon be experienced a remunerative return on the expenditure incurred, an improvement in health and in school attendance.

School attendance and illness.—Before passing from the diseases and ailments that have been considered in this and the preceding chapters, something may be said about school attendance, especially as affected by illness.

Regularity of attendance depends, of course, not only on freedom from illness, but also on comfortable home circumstances, on the children not having to walk an unreasonable distance, and on the absence of inclement weather. In this connection it may be noted that the attitude of parents towards compulsory education has undergone considerable change in recent years, and there is now springing up a wider appreciation of the benefits to be derived from attendance at the public elementary schools.

In the beginning the activities of the School Medical Service, inevitably leading to loss of attendance through the exclusion of ailing children

and those suffering from or in contact with infectious disease, were somewhat misunderstood. After a few years, however, it began to be apparent that parents were becoming aware of the value of medical inspection and treatment. As time went on, the usefulness of special schools, open-air classes, and organised games came to be more generally known, so that at the present day there is a more kindly feeling towards the system of compulsory education in force in the country.

The vast majority of children absent from school are kept at home on alleged medical grounds. Serious illness probably accounts for only a small proportion of the absentees; the remainder consist of children suffering from minor ailments, coughs, colds, and bouts of feverishness.

In a few instances reasons other than those of health are given for non-attendance at school, the more common being wet clothing, the lack of footwear, and trouble in the home.

The exclusion of "contacts."—It is often stated that one of the main causes of loss of attendance is the system by which children in contact with infectious diseases are excluded from school. The scheme generally adopted provides that a child living in a house in which there is infectious disease is excluded for a period rather longer than the time taken for the disease to incubate. In various localities, however, modifications are in force. In some

areas only those contacts thought to be susceptible to infection are kept from school, while in other districts children in the senior departments are excluded less rigidly than the infants.

The system of the exclusion of contacts is mainly directed at preventing a child who has been exposed to infection from falling ill in school.

Opponents of the system urge that children excluded from school are at least as likely to spread infection while playing in the streets or congregating in places of entertainment, and there would seem to be reason in this view. In rural areas, however, opportunities for meeting, except on school premises, are considerably less common than in towns.

That scarlet fever, measles, and other infectious illnesses have frequently been spread by the presence in a school class of children sickening for the diseases, cannot be denied. On the other hand, there is little evidence that in the common diseases of childhood contacts convey infection in their clothing.

While it is obviously necessary to keep from school such children as are in an infectious condition, it would seem that the question of excluding those living in an infected house should be reconsidered.

If children are examined every day by a trained nurse acting under medical supervision, and a close

watch is kept for the onset of illness, it is probable that contacts can be allowed in school without risk to their fellows.

In one county borough, with an industrial population of 100,000 persons, the following scheme has been in operation for about six months: The town is divided into twenty areas, in each of which there is school accommodation for approximately 1,000 children. A trained nurse is placed in charge of each area and acts as health visitor and school nurse; in fact, carries out all health work for which a woman is specially qualified.

During each morning the nurse visits every school in her area. She examines the attendance register, and makes out a card for each child absent for more than two days. Every class room is entered in turn and the teacher is asked to point out any child concerning whose condition an opinion is needed. Each child in the class is then quickly surveyed, particular attention being paid to those who are in contact with infectious disease at home. Minor ailments and other defects thus brought to light are treated in school or referred to a medical practitioner or school clinic. A child ailing or feverish is sent home.

This daily visit is often the occasion of advice respecting the ventilation, warming, or cleanliness of the class-rooms.

At intervals of about a month a careful ex-

amination of each child is made with reference to the state of cleanliness and freedom from contagion.

The cards on which are names of absentees are distributed among the nurses in whose areas the children live, and a home visit is made to determine the nature of the alleged illness, and the need for medical advice and treatment.

Immediately the plan of daily visiting and inspection was started there was apparent an improvement in the appearance of the children; they came to school cleaner in person and more tidy in clothing. The attendance rose almost at once about 6 per cent., and parents began to avail themselves of the presence of the nurse in school to send there for advice and treatment children who otherwise would have been kept at home.

By giving each nurse a comparatively small district, she soon gets to be known to the inhabitants, and frequent home visiting becomes possible.

In localities where home visiting is persistently carried out and a real attempt is made to assist parents when sickness occurs or insanitation is present, the nurse comes to be regarded as a friend to whom appeal is made in time of need.

By measures such as these the beginnings of disease will be discovered, the spread of infection will be checked, and the average man and woman will be enlisted in a national health campaign.

CHAPTER VI

The Cripple-Child

UNTIL recent years a cripple was understood to be a lame person, and those suffering from defects of the body and upper limbs were not looked upon as cripples unless lameness was also present. A wider meaning has, however, been given to the word, which now includes children who are abnormal on account of disease or defect of bones or joints, those suffering from paralysis, and those in whom there is serious disease of the heart. Logically, all physical defects, deafness, blindness, and the like, rendering a child unfit for education in an ordinary school or for participation in physical exercises and games, might be regarded as causes of crippling; but in considering the welfare of cripple-children it will be convenient to confine our attention to those who, through physical defect, are unable to lead an active life.

The ranks of the unemployed and destitute are still recruited from children mentally or physically defective.

The cripple-child is generally irregular in attendance at school, and in some cases receives no

education at all. On leaving school, cast into the world without a trade, shut out from unskilled labour through physical inability to compete with the able-bodied, he drifts into the workhouse or is drawn into crime. On the other hand, expenditure incurred in the treatment, supervision, and after-care of physically defective children is likely to show a profitable return, and many of the children eventually become highly skilled workmen and valuable members of the community.

The ordinary public elementary school is unsuitable for the majority of cripple-children, mainly for three reasons. Firstly, the children are generally backward, and therefore in need of individual instruction, impossible in a large class. Secondly, they are, as a rule, unable in the playgrounds to withstand the buffeting of healthy children, and beyond this they are often delicate, frail, and ill-nourished. In other words, they require the advantages of open-air life.

Some are so deformed as to be unable to use the desks and chairs of the ordinary school; to a few, walking is difficult; others are bedridden.

In order to be self-supporting in after-life it is essential that the physically defective child should begin to specialise at an early stage, so as to acquire a degree of skill sufficient to compensate for the handicap which deformity imposes.

The extent to which crippling is prevalent in

children of school age is somewhat difficult to estimate. A general survey of all abnormal children in attendance at school has been completed only in a few areas, and there is, further, a source of error in the fact that the names of a large number of cripples of school age are not on any school register.

Nevertheless, it can be said that about 1 per cent. of children of school age are cripples, so that in England and Wales, at the present time, there are some 60,000 children for whom special provision is required. Special day-schools for cripples can accommodate about 5,000 children, and there are residential schools for only about 300 cases, so that for the majority of cripple-children little is being done. This is the more to be regretted because in the treatment of deformities modern methods can achieve brilliant results.

With early recognition, prompt surgical attention, and persistent after-care, the twisted neck, the curved spine, the club-foot, can be straightened and the child be made a normal, active individual. The conspicuous success of the orthopædic hospitals established during the War surely points the way along which local authorities should proceed, and it is to be hoped that when these institutions have fulfilled their purpose of repairing the injuries of war, they may be used to restore health to the deformed victims of disease.

The recent experience gained in the treatment of deformities is likely to prove extremely valuable in years to come, and there are already available the services of a considerable number of medical men highly skilled in this special branch of surgical work.

The causes of deformity are chiefly four—tuberculosis, infantile paralysis, rickets, and defects of development.

Tuberculosis alone is responsible for nearly half of all deformities, and infantile paralysis for rather less than one-third. The first is the cause of diseases of spine, hip, and other joints. The second brings about wasted limbs and flail feet, indicative of destruction of nerve centres.

Rickets leads to pigeon-chest, bow-legs, and knock-knees; while among other defects are wry-neck, congenital dislocation of the hip, and simple curvature of the spine. Wry-neck is generally thought to be due to injury at birth; simple spinal curvature is the result of muscular weakness and the adoption of faulty positions in standing and sitting. Less common defects are club-hand, webbed fingers, the congenital absence of fingers or the whole hand, and the deformities due to injury and accidents.

The prevention of crippling must be sought in a reduction of the prevalence of the diseases occasioning deformities.

Surgical tuberculosis, which is the term usually applied to tuberculous infection of bones and joints, kills every year about 5,000 persons and maims at least four times that number. The origin of the disease is generally bovine, and the germs are usually taken into the human body by drinking unboiled tuberculous milk.

Obviously, the first step must be the elimination of tuberculous cattle from the herds throughout the country. The second, more complete and comprehensive supervision of the milk brought for sale into each locality.

No person should be allowed to keep dairy cows unless he can produce from time to time satisfactory evidence of the health of the cattle and of the milkers. The standard of sanitation of the cow-sheds needs revision. To this end an adequate number of whole-time veterinary surgeons should be placed on the staff of medical officers of health. In every district there should be frequent systematic bacteriological examinations of milk, and any found to be infected should be carefully followed to the source.

Until such time as all supplies are rendered free from harmful germs, milk should be boiled before use.

The success which has attended the distribution of dried milk by various municipalities, and the progress shown by infants fed on this food, open

wide possibilities for future action. The problems of the transit, storage, and home contamination of milk would soon be solved were the use of dried milk to become general. From the point of view of public health there seems to be no solid objection to milk being converted into powder. Certainly, the fears at one time expressed that cooked milk would lead to the occurrence of diseases such as scurvy and rickets have been proved groundless.

Surgical tuberculosis may also be caused by the consumption of tuberculous meat. It is essential, therefore, that private slaughter-houses should be abolished, and that all meat should pass through a public abattoir.*

If surgical tuberculosis is to any appreciable extent of human origin, the infection arises mainly from persons in an advanced stage of pulmonary tuberculosis. For these segregation is urgently needed, both in the interest of the community and for the comfort of the sufferer.

Even when tuberculosis of bones has begun, deformity can usually be prevented by appropriate treatment, the essentials of which are good food, fresh air, and absolute immobility of the affected part.

The earlier the treatment, the better the prospect

* For a fuller discussion of such questions, *see* "Food and the Public Health," by W. G. Savage, B.Sc., M.D.Lond., D.P.H. 1919. (English Public Health Series.)

of recovery. It is important, therefore, that during the class-to-class survey which should take place at least every month, the nurse should pay attention to signs of commencing tuberculous disease—joint-pains, and slight limping or stiffness of gait—and should refer all such cases to the Medical Officer.

In many cases the infection takes place before entry to school, and it is here that maternity centres and nursery schools are likely to be of value in the detection of the beginnings of disease.

Since deformity due to tuberculosis can largely be obviated by early detection and prompt and adequate treatment, parents should be warned to watch for the appearance of the danger signals—pains, limping, stiffness in movement, and at once to seek competent surgical advice. In every area facilities should be available whereby the services of specialists can be obtained for the treatment of those conditions for which consultants are usually sought by wealthy members of society.

Infantile paralysis is an acute infection occurring usually in those in the second and third years of life. In most districts a few cases appear each year, but from time to time epidemics break out in which persons of all ages are involved, with serious loss of life, and paralysis in many of the survivors.

In a typical instance a child is noticed to be feverish, and a day or two later is found to be

unable to use one or more of its limbs. The degree to which permanent paralysis persists is dependent largely on the skill displayed in after-treatment. With complete rest for a prolonged period, massage and electrical treatment, brilliant results can often be obtained, and a child at the onset completely paralysed in every limb will, after four or five months, almost entirely recover and be able to walk.

Crippling from this cause supervenes as a rule from failure to recognise the true nature of the disease and from neglect of after-treatment. The actual deformity is brought about by the weight of the body and the over-action of the muscles which escape paralysis.

At present the prevention of infantile paralysis is virtually limited to detection and isolation of the sufferer, disinfection of bedding and destruction of vermin. Crippling can best be avoided by careful, continuous, persistent treatment. Admission into hospital offers by far the best chance of success, and in almost every case in-patient treatment should be enforced.

Many instances of the disease, undoubtedly, are missed; but home visiting, attendance at maternity centres and nursery schools will lead, in the future, to the discovery of most of the defects before entry into school. The regular class-to-class inspection of all children should reveal the extent to which the crippling exists in those of school age, and at every

school there should be a register of all physically and mentally abnormal children, including those living in the school area but not in attendance at school.

Rickets, as a cause of deformity, is responsible for some 10 per cent. of the more serious defects; particularly bow-legs, knock-knees, and pigeon chest. The disease usually appears in the first year of life, and its presence is revealed by sweating of the head, delayed dentition, a soft flabby body and bony deformities. The bony deformities become more marked as the child begins to walk.

Rickets is due to some error in feeding, and the most reliable evidence appears to point to a deficiency of fat in the diet or failure to absorb the amount which is present. It is most commonly found in industrial areas where overcrowding, insanitation, and ignorance of infant management exist.

Rickets can be prevented, and, in the early stages, is easy to cure. The experience of medical officers shows that the spread of knowledge of infant feeding, following upon the establishment of schemes of home visiting and maternity centres, has brought about a reduction in the prevalence of this disease.

It is now rare to discover those terrible examples of deformity common fifteen years ago.

Chief among the preventive agents is the provision of an ample supply of pure full-cream milk

at a reasonable cost. Municipal depots at which milk powder can be obtained by all, irrespective of income, should be opened in every town.

Nor must it be forgotten that ill-health in the expectant mother may be a cause of rickets in the child, and that the removal of insanitation and the letting in of sunlight and air cannot safely be neglected.

Faulty posture.—One cause of deformity of the spine more easily preventable than any other is that due to faulty posture especially following upon the use of ill-fitting, badly-constructed desks. Even at the present day it is common to see children using school furniture several sizes too small.

Where the desks are not adjustable, a proportion of the children are certain to be ill-fitted, and as a consequence there is a twisting of the spine, particularly damaging to a weakly, malnourished child. The separate desk with seat and back which can be altered to suit each occupant affords a remedy that no education authority can lightly ignore.

How to treat crippling diseases.—Active surgical tuberculosis demands, in practically every case, institutional treatment. To complete immobility of the affected part, good food, and rest in the open air, few cases fail to respond, and even extensive abscess formation will subside. The treatment must be measured in years, not months.

Infantile paralysis in the early stages requires massage, passive movements, and rest in the open air. Later, operative treatment may be needed to correct deformities, and an apparatus may be necessary to prevent a recurrence of the contracture.

In rickets suitable dieting must be provided, with an ample allowance of fat. As a general rule, children suffering from this disease should be kept off their feet; by this alone bending of the legs can frequently be avoided. When well-marked deformity of bones has occurred an operation will, as a rule, be needed to correct the defect. Fortunately, the operative treatment of deformities affords some of the most striking examples of the progress of modern surgery. The twisted limb can be straightened, the lame can be made to walk, and by the transplantation of muscles and nerves the paralysed may regain strength.

The line of treatment to be adopted as soon as a cripple is discovered depends chiefly upon the degree of the deformity.

In slight, non-progressive defects not needing surgical treatment the child may remain in attendance at an ordinary elementary school, and may there undergo a system of physical exercise for the correction of the deformity; but even these minor defects can more appropriately be treated at an open-air school.

In the next category are the cases requiring active surgical treatment, those of wry-neck, club-foot, tuberculosis of bones and joints, and contractures following paralysis. Children with these conditions should be admitted into an institution under the care of an orthopædic surgeon. On discharge they may return to the ordinary school, to an open-air school, or to a special school for cripples. Whichever course be adopted, in no circumstances should the deformed child be left without after-care.

In the first place, the defect may recur, and the walking apparatus, where one is used, will soon become too small and require attention or renewal. In the second place, on leaving school the cripple may fail to obtain employment and be driven into a blind-alley occupation.

Supervision must not be allowed to cease as soon as suitable work is found, particularly in the case of girls, and the following up and home visitation should continue into adult life.

It is a matter of satisfaction that attendance at a special school for cripple-children affords an opportunity for each child to be taught a trade; as a result many become healthy workmen possessing technical skill in a high degree.

CHAPTER VII

The Mentally Abnormal Child

It is only during recent years that the State has begun to realise the national danger of mental abnormality and the loss occasioned by inability of a section of the community to be self-supporting. There is now considerable weight of evidence to show that much of the crime of the country is due to persons suffering from varying degrees of mental or moral degeneracy, and that to discover, classify, and train the children for whom education is possible, and to supervise and segregate the hopeless, is likely to be a wise and profitable expenditure of public money.

In the first place, it is necessary that a survey should be carried out under the direction of the Medical Officer in each area to bring to light all children mentally sub-normal, including those not in attendance at school. Although there is no difficulty in forming an opinion in instances of serious mental defect, the detection and classification of the less-marked cases are beset with pitfalls.

Broadly speaking, there are five groups of men-

tally abnormal children—the backward, the dull, the feeble-minded, the imbecile, and the idiot.

The backward.—The backward child is one whose mental development has been retarded through lack of mental exercise. The loss of education may be due to irregular attendance at school, owing to ill-health, truancy, parental indifference or unsatisfactory home conditions. On the other hand, a child may, through physical defect such as deafness or blindness, be unable to follow the instructions given to the class. The possibility that an incompetent teacher may be a cause of backwardness should not be ignored.

The first move in dealing with the problem is to discover those children who are too old for the class in which they are, and it is usual as a broad basis for inquiry to regard children as mentally abnormal who are two years or more behind the age of the class. The abnormal having thus been sorted out, a careful inquiry should be made in each case to discover into which group the child should be provisionally classified—the backward, dull, or feeble-minded.

It is helpful to remember that a backward child is generally in the same mental stage as a bright child of a younger age—that is to say, the mentality of a backward child of 10 would correspond to that of a normal child of 8 or 9 years of age.

The next step must be an attempt to discover

the cause of the condition. The child may have been late in beginning to go to school, or frequent changes of school may have interrupted attendance. Persistent ill-health, oft-recurring sore throat, bronchitis, enlarged glands, ringworm, sore eyes, and other minor ailments are other reasons for serious loss of education and consequent backwardness. By appropriate treatment the physical barrier to the reception of instruction must be removed, and then, in order that the leeway may be made up, the child should receive individual tuition, an impossibility in a large class of an ordinary elementary school. It is generally advisable, therefore, to form a special class for backward children. Reports from towns where special classes have been established show that, provided care is exercised in the formation and management of the class, very satisfactory results may be expected from money expended in the teaching of backward children.

The teacher must be carefully chosen, and should be one who, besides having a natural aptitude for the work, has had special instruction in the methods to be employed. The class should be small in order that there may be time for individual instruction. The ordinary curriculum should be modified to allow for manual work, physical exercises, and singing. The ages of the children admitted should be as little divergent as possible.

The younger the children are when accepted, the greater will be the success of the class.

Apart from the remedying of defects, measures must be taken to improve the physical condition of the children. Open-air life, rest, shower-baths, and free meals should always be provided.

In populous districts a special school for backward children can be opened, and the difficulty of teaching in the same class those of widely different ages can then be avoided.

The experience already gained leads to the expectation that after a year or two of attendance at a special class many of the children will be able to return to an ordinary elementary school and hold their place with other children. Without attention to health or individual instruction the outlook for a backward child in an ordinary elementary school is almost hopeless; his presence there is a drag on the other members of the class, and when he leaves school backwardness may be a bar to remunerative employment.

The dull. — A dull child may be regarded as one whose brain is structurally incomplete. The defect usually dates from birth or follows upon the occurrence of some serious illness which damages the brain tissues.

Probably one of the most important ante-natal causes of mental defect is syphilis, an infectious disease which is preventable, and in the early

stages not difficult to cure. The excessive use of alcohol for long periods by either parent, or the taking of certain drugs such as lead, may injuriously affect the mental capacity of the unborn child. But the marriage of feeble-minded persons is the main source of dullness in children.

If dullness be correctly classified as the first degree of mental defect due to imperfect development or disease, it is clear that a cure in the full meaning of the word cannot be expected, and that some amount of mental impairment will persist throughout life.

It is useless to attempt to train a dull child in an ordinary class, and for this group of children special individual instruction is needed similar to that which should be provided for those who are backward. In some thinly-populated areas the two groups can be taught in one class; in large towns they may be kept separate. An advantage of the combined class is that it may be used as a sorting ground for the observation of border-line instances of defect. With individual instruction for four or five years a dull child may leave school sufficiently well equipped to earn a living in competition with its normal fellows.

The feeble-minded. — A feeble-minded child will never be able to earn a living in competition with its fellows, nor will it be able without help to manage its own affairs.

Of the extent of the defect there is as yet no information completely reliable, but it is probably an under-estimate to allow for the presence of five feeble-minded children in every thousand children in the elementary schools. A town with a hundred thousand inhabitants might therefore be expected to have to deal with about a hundred feeble-minded.

The causes of the condition are mainly the same as those of the less serious structural defects which produce dullness; but, while there is ample room for further investigation and research, it is safe to assert that to heredity must be attributed the chief part in the production of the feeble mind.

The greatest hope of success in dealing with this problem will lie in the segregation of those affected, and in steps directed towards the prevention of the marriage of the mentally unfit. But the education of the public in the means whereby venereal diseases may be prevented, and in the vital importance of early and thorough treatment when they are contracted, is likely, in the future, to reduce mental deficiency.

Among the post-natal infections which are liable to damage the brain, infantile paralysis takes a prominent position; but, unfortunately, no specific means of preventing this disease are yet known.

Children who are feeble-minded will be discovered in the class-to-class survey in the schools, and teachers can usefully augment the register of

cases by referring to the Medical Officer children whom they suspect to be backwark, dull, or feeble-minded; but many of these are not in attendance at school, nor are they on the school register. As soon as the medical examination shows that a child is feeble-minded, arrangements should be made for admission into a special class or school.

There are, in the main, three courses which should be available for the training of such children—the first at a day school, the second at a residential school, and the third at a colony where permanent supervision may be maintained.

Day-school accommodation is required as a clearing centre for doubtful cases of mental defect, in order that it may be decided to what degree each child is educable, and as a training school for mild instances of abnormality. It is unsuitable for children who need continual supervision and cannot travel to the centre without a guide.

The day school should provide instruction particularly directed to appeal to the special senses, the training of the speech, the handling and recognition of various objects, brick building, counting, and, when possible, simple reading and writing. After three or four years an attempt should be made to begin definite manual work—domestic duties, laundry, gardening, basket work, and any occupation likely to be of use to the child in after-life.

The physical condition of the children should be improved by all available means.

Personal cleanliness must be a first care, and each child should be taught to wash the face and hands and cleanse the teeth—a pride in personal appearance is one of the first lessons to be inculcated. Physical exercises and organised games should be an integral part of the training, and three meals should be provided each day.

The building need not be an expensive structure, and should be planned on open-air lines in rural surroundings. With modern methods of transit the difficulty of access can soon be overcome. The advantages of ample playground space and opportunities for nature study outweigh the cost of providing means of conveyance.

Money spent on improving the health of mentally abnormal children who are educable is one of the best methods of insuring against failure of our educational system. After three months of life in the open air, rest, regular exercise, and suitable food, the change in the demeanour of some of the worst of these mentally defective children is remarkable.

In the milder cases the attention to health alone appears to be almost all that is needed to bring the child to a normal level for receiving instruction.

The one test whereby it can be decided whether a child should remain at the special day school or

be transferred to a residential school or colony is the rate of progress. If it is clear that in spite of improved health there is no likelihood of benefit from the instruction in reading and counting or in manual work, the child should be certified as uneducable to the local authority appointed under the Mental Deficiency Act.

A *residential school* will be needed for children living under unsuitable home conditions, for those coming from thinly populated areas where special day-school accommodation is impossible, and for marked examples of educable defect. The building should be in the country and of the open-air type. Ample grounds are essential for games, gardening, poultry-keeping, and other out-of-door occupations. It is advisable to have several separate pavilions to allow for some distinction to be drawn between the various degrees of defect, and for administrative reasons.

A *permanent home or colony* should be established for that residue of mentally abnormal children, including the imbecile and the idiot, which is uneducable or requires continual care. Many of the hopeless defectives are now to be found in Poor Law infirmaries, and some are kept almost concealed at home. Most of these children require constant supervision in comfortable cleanly surroundings such as only institutional life can provide. For economy in construction and general

working the colonies should be adapted to accommodate a large number of inmates. Although the imbecile and the idiot should remain for life, constant medical inspection should allow for the possibility of improvement and discharge.

For mentally defective children responsive to instruction, but too low in grade to be allowed out in the world unassisted, colony life is the only safeguard against poverty, misery and crime.

The epileptic.—The case of the epileptic must now be considered. He suffers from a malady which, in the slight and not progressive manifestations, may exert no noticeable influence on intellect. Except for the occurrence in school of occasional fits, no hindrance to education will be likely to arise.

Unfortunately, epilepsy tends to cause a deterioration in the mental condition of the child. The earlier the onset the more serious the outlook—the more frequent the fits the more marked the mental damage. The disease is not common. Various investigators have arrived at different conclusions with regard to the prevalence of epilepsy. Probably one child in about every five hundred suffers from the defect. The cause of epilepsy is unknown. Heredity seems often to be the only explanation, but in many instances no family history of the disease can be obtained. Injury at birth or damage to the brain by an infectious disease contracted in early

childhood is occasionally the starting-point of the epileptic fits.

The first essential in the management of an epileptic child consists in healthy living—regular hours of sleep, rest during the day, ample, nourishing, easily digested food, physical exercise and open-air life. The next requirement is regular medical supervision to discover the factors which bring about the onset of the fits, to take such steps as may be practicable to reduce the frequency of the attacks, and to improve the general condition of the child.

The type and amount of instruction which an epileptic can receive depend mainly on the degree of mental impairment. In mild cases attendance at an ordinary elementary school may be advised.

Indications that the disease is leading to mental enfeeblement point to the need for institutional treatment, and it is not far wide of the mark to assert that the vast majority of epileptics would be under better conditions in residential schools than at home. The orderly routine of institutional life, the constant medical care, with training graduated to the capabilities and requirements of each child, provide for epileptics the most favourable conditions for acquiring permanent bodily and mental health.

A colony for epileptics should be under the direction of a resident medical superintendent. The acreage and number of patients admitted should be

sufficiently large to allow of all the advantages of communal life, with dairy work, poultry-keeping, gardening, laundry, and workshops for various trades. Arrangements should always be made for the services of a dentist, an ophthalmic surgeon, and other specialists. As branches of the institution it will be necessary to set apart special pavilions for the reception of low-grade, feeble-minded epileptic children for whom training is useless. That the results obtained may be as permanent as possible it is advisable that suitable cases should remain in the colony for long periods. The automatic discharge from school of the children at the age of 16 is often fraught with grave consequences.

After-Care.—Much of the care expended in the training of children who are mentally abnormal will be in the end unavailing unless there are in every area adequate arrangements for the persistent following up of each child after it leaves the special class or institution. Some degree of after-care is needed by almost every normal child—assistance in the choice of suitable employment, facilities for recreation, for study, and, above all, opportunities for free dental and medical treatment. Much more is after-care necessary for those who are backward, dull or feeble-minded. Not only is it essential that such work shall be found as the child is able to do, but the conditions of labour must be continually kept under observation. Every endeavour must be

made to prevent unemployment; to this end the establishment of municipal workshops has been suggested, and from several points of view there is much to be said for the idea. The experience of various after-care agencies seems to show that without supervision many of the feeble-minded children fail to hold their own, and after a few years' competition with normal individuals drift into the ranks of the unemployed.

After-care should also extend to the provision of holiday camps, thrift clubs and other agencies for promoting the physical and mental welfare of school children in general. In organising a system of after-care, it is well to remember that during some nine years of school life the supervision of the children is carried out by trained nurses under the direction of the Medical Officer of the area. The satisfactory results which have been obtained through the efforts of the School Medical Service make it seem worthy of consideration whether public funds should not be made available so that following up and after-care could be maintained beyond school age by those at whose hands the child has received early training and attention. Continuity in methods of education and treatment would then be possible, and there would be the additional advantage that the welfare of each child would become a matter for the personal guardianship of the few, whereas now it is mainly of academic interest to many.

CHAPTER VIII

School Buildings

FAR too little importance has been attributed to the influence which school buildings can bring to bear on the health and education of children. Too frequently it appears to be forgotten that for some nine years the school provides the principal environment of the child, and should therefore, in design, sanitation and surroundings, set an example for the home, the office, and the workshop. That a dark, ill-ventilated class-room will injuriously affect the physical condition of the occupants the reports of medical officers conclusively show, but there is still hardly any appreciation of the opportunities for teaching personal cleanliness and domestic hygiene afforded by a modern, well-constructed school.

The value of the open window, the use of the fireplace as a means of ventilation, the advantages of sunlight, the dangers of dust and dirt are subjects which can easily be illustrated by reference to structures in the school.

The inculcation of habits of cleanliness loses

much of its force when there are neither hand basins, bowls, nor soap on the premises, and the only cloak-room is a passage leading into school.

Lofty, light, airy schools will breed a spirit of discontent with the insanitary houses from which many of the children come, and will eventually lead to an improvement in the homes and workplaces throughout the country.

Unhappily, there are yet in use as schools a large number of buildings which structurally and through gross errors in sanitation are totally unsuitable for the purpose.

While the impossibility of at once sweeping away these centres of ill-health is recognised, it is surely not too much to hope that education authorities generally will speed on the provision of buildings worthy to be object lessons in the fundamental principles of sanitation.

Until recent years it was considered essential that a school should be as near as practicable to the homes of the children, and to this end, in urban districts, it is common to find school buildings situated adjacent to works or abutting on to a main thoroughfare. But now improvement in means of transit and the opening up of rural areas adjacent to towns render possible the utilisation of suitable sites in the country, free from undesidable surroundings. The land on which a new school is to be erected should be sufficiently extensive to allow

for open-air education and for organised games. At times these requirements may be met by the use of a public park near by.

The site should be exposed to the sun and screened as far as possible from the prevailing winds; it should be free from dust, smoke and noise, so that the windows of the class-room can be open throughout the year.

The minimum area of the site should be based on the standard of an acre for every 200 children, with additional land for special purposes, such as school gardens, cookery centre, or caretaker's house. Unless a playing-field is provided for organised games, the area of the playground should be 8,000 square feet for 200 older children. There should be separate playgrounds for boys and girls, and for infants, but every endeavour should be made to obtain a field for cricket, football and other games. When a playing-field is acquired, the playground need only be sufficient for physical exercises.

While fully admitting the desirability of large schools with separate departments, each department with a head teacher, it must be urged that a department should not contain more than 400 children, so that the whole school would provide accommodation for 1,200 children. In some instances it may be necessary to admit as many as 1,800 children; it is then advisable to build two

junior departments, and a senior department, each for boys and girls, retaining the juniors until they reach the age of nine or thereabouts.

Unless the land is very costly, the school should be of one storey only, and so arranged that each class-room has windows on opposite sides, giving direct access to the open air. Until recently it was thought that the windows on one side of a class-room might open into a corridor or hall. This method of ventilation now stands condemned, and no education authority should, in any circumstances, countenance the erection of a school which does not allow each class-room to obtain fresh air on opposite sides.

Each department should be self-contained and possess separate entrance, class-rooms, cloak-rooms, teachers' rooms, store-rooms, lavatories and closets. A common hall may be provided for the elder boys and girls, but, as a rule, the infants should have a separate hall or playroom.

The hall must be well lighted, warmed and ventilated, and so placed that noise in it will not disturb the work carried on in the class-rooms; for these and other reasons it is often convenient to build the hall detached from the school. The floor space of the hall should be calculated at 3½ square feet at least per child, with a maximum of 1,500 square feet.

For infants a separate small hall or playroom is

essential in order that the children can march and play indoors; this room must also be detached from the class-rooms.

The class-room should generally not accommodate more than thirty children, although forty, under certain conditions, may at times be allowed. Not only must each class-room be ventilated from the open air by windows on opposite sides, but one side should so be made that it can be thrown completely open, and so arranged that it can be cleared without disturbing any other class. Each room should have a fireplace at the teacher's end of the room in the corner remote from the door. The floor space should not be less than 10 square feet per head; in the case of infants 9 square feet may be allowed; but a play-room should provide at least 12 square feet per child.

In height the class-room should measure at least 12 feet, unless there are windows on opposite sides, when the height of the room may be slightly reduced, and the tops of the windows should reach almost to the ceiling. The windows should be of clear glass, and should be so constructed that they can be completely opened. French casement windows can be used for one side of the room. The minimum window space should be one-quarter of the floor area, but one-third is a more satisfactory proportion. In no circumstances should a window face the scholars or the teacher. As far as possible

the windows on one side of the room should look towards the south-east or south. Ventilation should be carried out by windows and the fireplace. Wall gratings and other air inlets or outlets of various types are unnecessary, and should be avoided.

A teacher can do much to instil into the minds of children an appreciation of simple lessons in hygiene by timely reference to the proper use of the window and the fire.

One of the most important details in ventilation is to ensure that the cold air sinking to the floor does not chill the feet of the scholars. The danger may be overcome by converting the lower part of the windows into a hopper with closed sides, thereby directing upwards the incoming current of air. The radiators placed under the windows bring about the same result. Schemes of artificial ventilation providing for the supply of hot air to the class-rooms should be rejected. Air which has been tampered with loses its freshness, and devitalised air is generally undesirable.

The heating of a school is best effected by a low-pressure hot-water system to be used in conjunction with open fires; the radiators should be placed under the windows, and about 30 feet of heating surface allowed for each 1,000 cubic feet of air space in the room. Slow combustion stoves and gas radiators should not be used in schools. These

methods of heating are dangerous; they pollute the atmosphere and are otherwise unsatisfactory.

The water supply must be adequate and pure. In most instances a public supply will be available, and will be laid on to closets, lavatories and special centres. For drinking purposes the use of the common cup should no longer be permitted; it is undoubtedly responsible for the spread of many diseases, and has nothing to commend its retention in schools or elsewhere. Each department should be provided with one or more fountains with an upward jet, so that a child can drink by holding the mouth above the aperture from which the water is forced. No part of the fountain can come into contact with the lips of the child.

In country districts it may occasionally be necessary to pump water from a properly constructed well into a storage cistern from which drinking water can be supplied, but any water needed for the flushing cisterns of closets or urinals must be obtained from separate storage. Each department must be provided with sufficient facilities for washing, and not less than four basins for every fifty children will be required if the children are to be instructed in personal cleanliness. The basins should not be placed in a passage or cloak-room, but be fitted in a room set apart for the purpose. The entrance and exit should be separate. The walls in front of the basin should be tiled and the

floor should be impervious, and channelled to a gully outside the building. The room should be thoroughly ventilated, well-lighted and disconnected from the class-rooms. Soap should be available, but the common towel ought not to be allowed. Probably the only satisfactory alternative is to insist on each child bringing to school and using daily a towel, brush and comb.

A cloak-room of ample dimensions is essential for the health and comfort of children. It must be well ventilated, and specially constructed to allow of the drying of wet clothing. The room should be near the entrance in each department, and be sufficiently commodious to permit 12 inches of hanging space for the clothing of each child.

It is advisable to hang in one tier only. In order to meet the need for rapid drying, the frames on which the clothing is suspended may be made to be drawn up into the enclosed freely ventilated and heated portion of the room. The floor must be impervious, and constructed to drain into a gully outside the building. The walls should be tiled, and there should be a gangway of at least 4 feet between the rows of pegs. Wire cages for footgear are desirable, and in schools drawing children from long distances it is well to provide a small room in which the clothing may be changed.

Each department must have a complete equip-

ment of sanitary conveniences for the children, in a building entirely disconnected from the school. The closets and the approaches to them must be separate for boys and girls. Care should be taken so to arrange the building that there is privacy of access, and that windows of the school or of neighbouring property do not overlook the closets or urinals. Each closet should be ventilated, lighted, and have a door 3 inches short at the bottom and 6 inches short at the top. In each compartment there should be a single pedestal hand-flushed closet basin, with a separate flushing cistern. It is unreasonable to expect children to use properly the closets in their homes unless they are taught as a routine to flush the closets at the school. Any automatic system of flushing should be rejected on educational grounds.

It is usual to recommend one closet for every fifteen girls, and one for every twenty-five boys. In infant departments each seat must be of suitable size and height for young children, but it is totally erroneous to consider that children 4 or 5 years of age are not strong enough to pull the chain of a flushing apparatus.

For the boys, urinals should be provided in the proportion of 10 feet of urinal to every hundred children, and it is necessary to arrange for an automatic flushing system.

It is advisable to divide a urinal into stalls, but

An infants' class-room.

PLATE V.

in any case the urinal should be partitioned off from the closets.

At the present time there are, even in urban districts, many schools where the children are compelled to use a pail closet or open pit. These disgusting contrivances should no longer be permitted to endanger the health of the scholars.

In some country areas it may be impossible to secure a water-carriage system, but inasmuch as drains have to be provided for rain and slop water, the instances in which earth closets have to be fitted should be extremely rare.

Not only on grounds of health should every endeavour be made to provide separate hand-flushed water-closets. Any scheme of education which does not train a child in personal cleanliness and the simple rules of a healthy life, or fails to hold forth the school as an ideal, is based on a wrong foundation. School buildings and equipment should be such that it is the ambition of each child to own a house possessing the improvements of a modern school.

Every child must have a suitable seat in the class-room. For infants small tables with arm-chairs should be supplied. In no circumstances can forms without backs be considered satisfactory. For older children single or dual desks are advisable, but whatever method of seating is provided it is essential that the seat should be adjust-

able to the size of the occupant. The feet of the child should rest comfortably on the floor, the thigh should be horizontal and the leg vertical. The back of the seat should fit to the curve of the back of the child, and there should be support as high as the shoulder blades. The writing surface should be of such a height that the child can sit comfortably upright while writing, and the edge of the surface should just overlap the edge of the seat. Desks can now be obtained with the seat, back, and writing surface easily adjustable.

Permanent injury to the spine may be brought about by the use of ill-fitting desks or forms, and damage to the eyesight may follow upon cramped positions in reading and writing.

The slate and sponge should be permanently abolished from the school, and a pencil or pen in common should no longer be permitted. Every child should have a small labelled box in which to keep writing and drawing materials and other personal objects. In infant departments, particularly, infectious diseases have unquestionably been spread by the common use of various articles. Every effort should therefore be made to reduce as far as possible the risk from contamination of pencils, toys, towels, modelling clay, sand heaps, and drinking utensils.

In times of epidemics, cleansing, disinfection,

or the total prohibition of the common use of these articles should be enforced.

Blackboards should have a dead black surface, and be painted at regular intervals so that there may be the maximum contrast between the white chalk and the black board. A greasy surface is difficult to write upon and a source of strain to the eyes of the scholars. The illumination of the surface should be considerably in excess of that of the rest of the room, and in order that this may be possible without glare, it is necessary to shade the blackboard lights so that the direct rays of lamps do not fall on the eyes of the children.

The subject of the artificial lighting of schools is intimately related to the physical welfare of the children. In the first place, there is an appreciable risk that ill-lighted rooms may injure the sight, and particularly is it dangerous to attempt to do fine needlework in artificial light. Secondly, it is important that shadows should not be thrown on the reading and writing surface; and thirdly, every reasonable precaution should be taken to prevent the occurrence of glare. In other words, a careful system of shading of the lights must be arranged so that the direct rays do not cause a temporary blurring of vision. Shining polished surfaces of walls, desks, or paper are very liable to increase the glare, and should, as a consequence, be avoided. Nor must it be forgotten that gaslights consider-

ably pollute the atmosphere; rooms in which gas is used should therefore be freely ventilated. A soft, steady light, well shaded and diffused throughout the room from a dull white surface, should be the aim of those responsible for school construction.

In school construction far too little attention has been paid to the provision of suitable accommodation for the teachers, and it is common to find that buildings have been erected without a room set apart for the teaching staff. In a large modern school there should be near the entrance, for each teacher, a room in which parents and scholars can be interviewed, and generally work undertaken which cannot be transacted in a class-room. Near by a lavatory and closet should be provided.

Separate common rooms for men and women teachers will be necessary, and facilities should be available for simple cooking for a midday meal. Among the furniture of the room should be a cupboard and comfortable easy chairs. The common rooms should be situated in such a position that supervision can be maintained over the playgrounds.

Cloak-rooms, lavatories and closets must be provided for the staff, and for women these must be in the school. The cloak-room should contain lockers, seats and boot racks, and means whereby the drying of wet clothing and footwear can be carried out. The lavatories should also contain lockers, so

that each teacher can keep on school premises a hair-brush, towel and other personal articles. The closets should not open out of the teacher's room, nor should the access to them be under the observation of the children.

To meet the requirements of teachers living at a distance from the school it may be thought advisable to use a room for the storage of bicycles. A lock-up building in the playground is generally more convenient than a room in the school.

CHAPTER IX

The School Annexe

One of the most hopeful signs of the awakening of the nation to the importance of securing a healthy childhood is seen in the gradual elimination of the small insanitary school and its replacement by large, light, airy buildings—object lessons, it may be repeated, in the value of cleanliness and sunshine. The modern public elementary school should be for each child something more than walls within which it is forced to spend nine of the most impressionable years of life. It is within the power of local authorities to provide schools which shall be completely equipped, self-contained units for each locality, offering to the children of the people such facilities for health and education that life in the public elementary school will be a pleasant memory in after years. Each new school should be sufficiently large to allow for the following annexes, viz. a canteen, a gymnasium, a treatment centre, baths, playground, and playing-fields.

The canteen.—The school canteen is rightly regarded as an essential element in the constitution

of every school, and it is difficult to over-estimate the value of systematic and adequate arrangements for the feeding of children. To take the lowest ground, it is a waste of money to attempt to educate children so ill-nourished that they are unable to profit by the instruction given, but, far beyond this aspect, health and comfort, as well as economy, point to the need for the provision of meals for all school children.

It is the experience of every Medical Officer that, in industrial areas particularly, it is a common sight to see children hurrying to school with their breakfast in their hand. Often, too, the distance to be traversed allows only a few minutes in the house for the midday meal. With a canteen on the school premises the food can be taken at leisure and in comfort, and there is ample time for washing before dinner and for a period of rest after.

Nor must the educational side of school feeding be valued lightly. Personal cleanliness, the orderly use of the knife, fork, and spoon, good manners during the meal, and an appreciation of table decoration can all be gained in the well-managed school canteen. Certainly, the catering can be carried out more economically in school than in the average home, and more appetising and more nutritious meals can be put before the children than are possible under the conditions of a working-class household.

The canteen should be on the school premises, and the kitchen and scullery be fully equipped with modern cooking utensils. A steriliser should always be provided so that every article in common use can be steamed after being washed. This precaution is essential if the spread of infectious diseases is to be avoided. The dining hall should be light, airy, and roomy enough to permit of the free movement of those waiting on the children. The supervision of the centre and the entire management should be in the hands of the head teacher of the school, who should have a competent cook and domestic staff. All purchases should be made through a distributing depôt, and there should be little storage of perishable articles at the canteen. In some districts where the feeding centres are small the preparation and cooking is carried out at a central kitchen and the food is conveyed to each canteen in insulated containers. With a large school the most satisfactory method is the self-contained canteen, under the control of the head of the school.

The method of selecting the children to be fed varies in different localities, and it is unfortunate that, as a rule, the poverty test should be employed. On this test alone many who greatly need food are ignored. Beyond all question, the method most likely to result in a general improvement in the physical condition of the children is that which

allows for the selection of suitable cases by a trained nurse under the direction of the medical officer. By the regular daily survey of all children in school by a nurse acquainted with the conditions obtaining in the homes, few cases requiring the provision of meals should be overlooked. Medical officers generally should keep closely in touch with the work of the school canteen and utilise the opportunities for research work afforded by the children in attendance at the feeding centres. Much more might have been done in the past to investigate the scientific aspect of this and other problems had the School Medical Service been adequately staffed.

Most useful pioneer work has been done by many authorities during the last decade in establishing and maintaining feeding centres, and the remarkable physical and mental improvement shown by the children and their increased capacity to benefit by the instruction provided have won a permanent place for the school canteen.

The time is surely ripe to consider whether a system of school meals should not be adopted throughout the country. In every new school, at least, a suitable annexe should be provided for the preparation and serving of food. In rural areas it is now quite common for children to bring a mid-day meal to school. Even among the small schools there are few in which some arrangements for simple cooking could not be made, and in country

districts adjacent to towns more use could be made of the large schools erected by the urban authorities.

The gymnasium. — A universal system of physical training beginning in the infant departments of the public elementary schools and adapted to meet the requirements of the growing child must form the basis of any sound scheme for safeguarding the health of the nation. The training generally advocated for use in schools is that embodying free standing Swedish exercises, together with certain gymnastic games and simple dance steps, while in the infant departments, particularly, breathing exercises should be taught.

First, it is essential that the teachers themselves should have undergone a course of instruction not only in the performance of the exercises but in the methods of teaching to be employed. A clever performer is by no means always a capable instructor. Secondly, little benefit is likely to accrue from physical exercises unless the children enter into the spirit of the movements, and are permitted to give vent to the feeling of exhilaration which should arise from the drill. Thirdly, no opportunity should be lost of taking the training in the open air.

Although a gymnasium and its equipment are not absolutely indispensable for physical training of the Swedish type, yet it is undeniable that appa-

ratus exercises greatly increase the enjoyment and add to the success of the scheme. For these and many other reasons every modern school should have a gymnasium.

While Swedish exercises should, as a rule, be carried out in the open air, during inclement weather a modified course can occasionally be given in a class-room.

The importance of teaching indoor and playground games should not be overlooked. Development of the powers of observation, of the muscles, heart and lungs is stimulated by the physical exercise and love of play engendered by circle games and those which permit many children to take part at the same time.

Simple dance steps appropriate for infant departments, and national dances—jigs and reels—are extremely useful forms of physical training, promoting orderly movement, self-control and graceful carriage.

Probably one of the most useful exercises for the infant departments is that known as pocket-handkerchief drill. At a given word each child produces a handkerchief, and then in a regular sequence of movements the class go through the process of breathing in, blowing the nose, wiping the nose, and putting the handkerchief in the pocket. The urgent need of this procedure, and of breathing exercises, is general, for on entering school few

infants possess a pocket-handkerchief, and hardly one knows how to use it.

The playground.—Too little attention has in the past been given to the provision of suitable playground accommodation. Local authorities have been hampered by the prohibitive cost of the land adjacent to the schools, and there has been some confusion with regard to the purpose for which the playgrounds were intended. On the other hand, in some districts an attempt was made to use the playground as a playing-field, and in others the space provided was so inadequate as to furnish little more than an airing court.

At the present time sufficient land should be obtained to allow for outdoor physical exercises, playground games, and open-air classes, but no attempt should be made to provide for organisel games such as football or cricket on school premises.

The surface of the playground should be level, smooth, but not slippery, and carefully channelled so that after rain it soon becomes dry. It is important that no part of the surface should be left unpaved; flower borders and allotments are more likely to succeed when cultivated some distance from the school, and uncovered areas of soil are soon trodden into quagmire in wet weather.

There should be separate playgrounds for boys and girls, but infants can share the girls' playground if the area is sufficient.

The School Annexe

It has been recommended by a Departmental Committee that where other provision is made for games, every undivided playground for 200 children should provide 20 square feet for each older child and 16 square feet for each infant.

Where there is no other provision for games the amount of space allowed for older children should be increased to 30 square feet.

A roof playground is a possibility in areas where the site is very expensive.

Playing-fields. — Only during very recent years has serious consideration begun to be given to the advisability of providing playing-fields in connection with public elementary schools. Children living in industrial districts are generally left to accommodate their games to the topography of an alley or a waste heap. A wall is the wicket and two coats form the goal. The time has come to give the children of town people a chance to gain that initiative, self-reliance and robust vigour of mind and body which for centuries was so well acquired on the village green and on the playing-fields of public schools.

The field can be in the outskirts of the town and reasonably easy of access, and it can be used by several schools provided that each has a reasonable time every week for play and practice. The half-day match, when more than three-quarters of the children act as spectators, is a totally insufficient

use of the opportunities for exercise afforded by a playing-field. Organised games should be directed by a teacher, who will be responsible for the management of the ground and the conduct of the children. Cricket, football, hockey and tennis should be taught, and running and jumping and other forms of school sports taken up. The avidity with which children turn to active exercise, particularly of a competitive nature, makes it desirable that a close watch should be maintained to detect signs of heartstrain, especially in those entering for school sports. A medical grading might be carried out, so that to physically delicate children special exercises could be given to remedy their defects.

Swimming.— Among other physical exercises, swimming should be generally taught to children attending the public elementary schools. It is in all respects likely to endow a child with self-reliance and fearlessness, and may at any time be a means of saving life. Suitable arrangements should be made so that each child must have a shower bath and a cleansing of the skin, particularly of the feet, before entering the water, and a medical survey should always be carried out to exclude from the plunge bath children who are verminous, have discharging ears, or are otherwise likely to be a source of infection. In most localities there are insufficient facilities for swim-

ming, and as a result far too many children are allowed to be together in the bath—an unwholesome state of things, which is also prohibitive of individual instruction.

It should be an aim of the teachers of physical exercise to promote competitions between the various schools in each area, and local authorities by the gift of trophies can do much to encourage a spirit of rivalry in all branches of school work.

School baths.—Already several towns, in erecting new schools, have made provision for school baths, and the plans for every modern school should allow for bathing on the school premises. To economise in floor space and water, it is usual for spray and shower baths only to be installed, but experience has shown the need of slipper baths as well.

Baths must be supplied with both hot and cold water, and should be sufficient to permit of twenty children bathing at one time. Dressing boxes will be needed, and an attendant must always be present to supervise and assist. By taking the children in relays it is quite possible to deal with a class of forty children in an hour, and to bath each child once a week. To the advantages to be gained from regular cleansing it is hardly necessary to refer. The general health of the children improves; they become more alert and better able to benefit by the instruction given. No less important is the fact

that they are trained in personal cleanliness, and soon begin to appreciate the comfort and sense of well-being following upon the taking of a bath.

In connection with schools already built it may be possible to provide baths in a basement or out-building, or a new school can be used as a centre for children attending other schools in the neighbourhood. In instituting the use of school baths, it is important that the children should be made to feel that bathing is a routine, and not a punishment for uncleanliness. Further, the baths should be considered a preliminary to swimming exercises, and not a substitute for them.

Play centres.—It cannot be doubted that school buildings might be utilised to a greater extent in the social life of the children. As play centres in the evening and during the holidays, the schools might come to be looked upon as a club to which the children could resort for recreation and amusement. For a playground outside school hours, a town child now has hardly any choice but the street.

Treatment centres. — A treatment centre must be regarded as an essential annexe of every large modern school, but the number of rooms required will depend to some extent on the amount of decentralisation considered advisable in any area. It is now usual to find established in each urban area one or more centrally situated clinics at

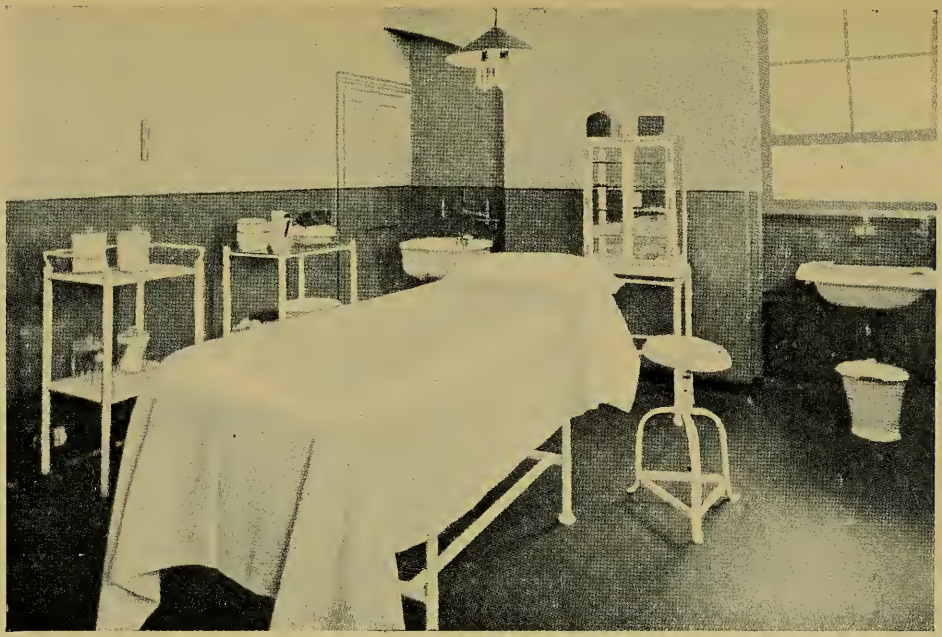
which minor and major ailments and defects are treated. While it is clear that the removal of tonsils and adenoids and the X-ray treatment of ringworm can for many reasons best be carried out at a fully equipped central building, there is evidence pointing to the desirability of dealing on school premises with minor ailments and some other conditions. When children are sent from school for treatment at a clinic there almost invariably follows a considerable loss of time and education, and some irregularity in attendance at the centre. These disadvantages are the more marked as the distance to be traversed increases.

Every School Medical Officer should have a staff sufficient to permit of the daily visiting of each school by a trained nurse, who, during her survey of each class, can refer for attention minor ailments and trivial defects. The treatment can be given in a room provided for the purpose at the school. The room should have a supply of hot and cold water and be fitted with a sink.

It is essential that lighting and ventilation should be adequate, and for this reason, at least, the room should not be in the basement. To meet the need of accommodation for medical inspection and the testing of vision, the length of the room must be at least 20 feet, but it is generally more satisfactory to set apart a second room for medical examinations.

Doubtless the time is not far distant when every large modern school will have rooms for medical inspection and for the treatment of minor ailments, dental defects, and defective vision. Until such provision is made general, the many disadvantages arising from travelling consequent on treatment off the school premises will continue to be an obstacle to the progress of school medical work.

A central clinic for two purposes will, as a rule, be found necessary. Firstly, for the inspection of children requiring a more complete examination than is possible at school, and of those concerning whose condition the nurses and teachers may desire information. Secondly, for the treatment of ailments and defects. The accommodation to be provided will depend on the number of children likely to be in attendance. A large, light, airy waiting-room must be the first consideration, and here the children should be under supervision, even though there be only a short interval to wait for treatment. Leading off the waiting-room should be separate rooms for the treatment of minor ailments, for operations on the nose, the throat, dental work, the correction of defective vision, and the application of X-rays. A consulting-room must also be provided, and in some instances a dispensary. In all, about twelve rooms will be needed in a complete scheme for the treatment of the more common defects in school children.



Operating-room of a school clinic.

PLATE VI.

The School Annexe

An exit separate from the entrance is an advantage to a treatment centre, and it is generally advisable to avoid the use of stairs as much as possible. The need of extensions must be borne in mind, for it is rare for a centre not to require enlargement.

For dental work a well-lighted operating-room is essential, and, adjoining, a recovery-room should be provided. For the removal of tonsils and adenoids and other operations necessitating a general anæsthetic, three rooms should be set aside—for undressing, operating, and recovery. In an emergency it may occasionally be found necessary to detain a child overnight, and to meet this, a room fitted as a single-bedded ward is always useful.

In almost every instance central heating is the most economical method, and in some districts it has been found advantageous to utilise one or more rooms at the clinic as a cleansing centre. If this course be adopted, a steriliser for clothing must be added, as well as a bath-room. These will allow of the treatment of itch being undertaken with some prospect of success.

The staffing of the clinic should be in the hands of the Medical Officer, and by far the most satisfactory system is that by which arrangements are made for treatment to be carried out by men who are specialists in the various branches of the work —anæsthetists, ophthalmic surgeons, and other

experts. To ensure this, one of two courses may be followed: a whole-time specialist can be appointed if the school population is sufficiently large, or the part-time services of consultants may be retained; but in no circumstances should the treatment be left to a rota of general practitioners. An expert in several branches of medicine or surgery exists only in his own imagination.

Dental treatment should be carried out by whole-time school dentists in the proportion of one dental surgeon to about 2,500 children to be treated annually. In no district as yet is the dental treatment adequate when measured by this scale.

The nursing staff should be fully trained, and under the supervision of a matron or sister-in-charge. The size of the staff will be determined by the amount of work performed at the centre, and in particular by the number of children with minor ailments. One nurse can thoroughly treat only about twenty children in an hour. Each dental surgeon needs the whole-time services of a nurse, and at least three nurses are necessary at throat operations. The nurses at the treatment centre may be regarded as a reserve from which to draw as necessity arises. In some localities it has been found an advantage to use school clinic nurses for the home nursing of cases of ophthalmia, pneumonia, tuberculosis and other serious illnesses, and there is much to commend this co-ordination in

Public Health work. Just as it is plainly absurd to have several health visitors calling at the same house on account of infant welfare, tuberculosis, measles, or the following up of defects found in children attending the public elementary schools, so in the home the nursing of all ailments should be performed by one person and not by different nurses for different diseases.

The complete administrative control of the clinic must be entirely in the hands of the Medical Officer, and he alone should be directly responsible to the local authority. Divided responsibility invariably leads to overlapping and inefficiency.

CHAPTER X

Special Schools

THE systematic medical inspection of school children, as we have seen, has revealed the presence of many ailments and defects, some of which prevent children from being able to benefit by the instruction given in an ordinary public elementary school. Fortunately, remedial measures, such as the provision of suitable glasses and operations for enlarged tonsils, can remove most of these obstacles to education; but there remains a small percentage of children, although in the aggregate the number may be large, for whom special facilities are required, and to meet this need special schools have been established.

Much has been done to provide suitable instruction for children suffering from serious degrees of physical and mental defect, yet there are still in England and Wales probably not less than 30,000 for whom no space in a special school is available. The wisdom of expending time and money in educating children unable to be taught in an ordinary class is now beyond controversy.

Without assistance, the crippled, dull, or ailing child leaves the elementary school at the age of 14 doubly handicapped by the physical or mental weakness, and by the failure to attain a reasonable standard of education during school life. He becomes unemployable, a burden on his parents, and eventually a charge on the community. On the other hand, admission to a special school is likely to improve the health of the child, and fit him to become a self-supporting unit and, in many instances, a skilled workman.

Open-air schools.—Instruction in the open air has been practised for many centuries, and to-day it may be seen in operation in playground classes, nature study rambles in the country, classes in the parks and open spaces; in fact, any teaching in the open air and sunlight may be regarded as open-air education. The value of this method of training is unquestionable; the children improve in health, become more alert, and are better able to profit by the instruction given. Throughout the country there is an urgent call for a great extension of open-air teaching. Playground classes and the like can easily be arranged at little or no additional cost or inconvenience to the working of a school. Though, in a few districts, there may be schools so deficient in playground and so far removed from a park or other space that instruction in the open air is impossible, yet it is safe to assert that where

a local education authority has the will, suitable accommodation can generally be found.

An open-air school is something more than teaching in the open air. The thin, weakly, tired, anæmic child, living in an insanitary area, sleeping in an overcrowded room, often improperly and insufficiently fed, needs more than air and sunlight. Such a child requires as well food, rest, medical attention, and special methods of education, particularly those inculcating personal cleanliness, care of the teeth, skin, and hair, physical exercises, handicraft classes, and gardening. A close medical supervision should be maintained in selecting the children to be admitted, the treatment of the ailments and defects, and the duration of the child's stay.

The open-air school should be situated in a sunny, sheltered, accessible site, affording ample space for physical exercises, play, and gardening. An acre to about fifty children is the standard usually taken. The buildings may be temporary or permanent. Simplicity in design and economy in construction are essential. All the rooms should be on the ground floor. Each class-room, to accommodate about twenty children, should have a south aspect, and may be enclosed on three sides only, or the windows can be made to fold back so that the front of the room is removed. In order that the school may be occupied through the year, heating will be necessary.

It is generally more economical in the end to instal a low-pressure hot-water system. Lavatories, shower-baths, cloak-room, closets, a kitchen, dining-room, scullery, and medical-treatment room must be provided, and a large resting room or shed, with a canvas stretcher and rug for each child. A head teacher, a trained nurse, five class teachers, a cook, and three domestic servants will be required for a school of about 100 children. The daily routine will vary according to local circumstances. Broadly, it may be said that the children should attend early and leave late. On reaching the school, about 8 o'clock, they should have breakfast; nature study, manual work, and the ordinary school subject would occupy the morning; dinner would follow, and then an interval of an hour and a half for lying down. In the afternoon a further period of class instruction, and then tea. Every child should possess a labelled toilet outfit, and should daily have a bath. In summer the children should leave about 6 or 7 o'clock.

Local education authorities which have done pioneer work in the open-air movement have shown conclusively that it is essential to link up in the closest manner possible the special school and the School Medical Service, so that medical supervision may be complete, from the home to school, and the improvement in health gained under the régime of the school may be maintained by suitable

advice to the parents and by the removal, by ordinary Public Health measures, of insanitary conditions in the home.

The ground gained in the day may be lost in the night.

Open-air residential schools.—These schools have been established to meet the case of children whose home circumstances are so unsatisfactory that it is hopeless to attempt to cure until they are removed from home so that continuous medical and nursing attention may be maintained for a long period.

There are as well children suffering from long-standing defects that require many months' persistent treatment under open-air conditions—quiescent heart disease, anæmia, and intractable malnutrition.

Instances of tuberculosis or other infectious illness should not be admitted to the residential school.

The site need not be close to the district from which the children come; in fact, it is generally better to arrange for the school to be at least five or six miles from the homes of the children. In area and plan of construction it should not differ largely from the open-air day school, except in so far as accommodation must be provided for dormitories, laundry, and staff quarters. An isolation ward is advisable, if only for suspected cases of

disease. The institution should be under the control of a medical superintendent, and a matron must reside on the premises. The teaching staff should be non-resident, and as far as possible ordinary school work should be relaxed in favour of handicraft and outdoor manual occupations. Organised games, country walks, and nature study should be freely undertaken.

The treatment of defects, such as enlarged tonsils and decayed teeth, should be carried out before admission to the school, and it is important that careful inquiry and a medical inspection should be made on entry to eliminate infectious diseases. During residence at the school the children should be seen by a dentist at least once a month.

Medical officers and others who have worked in industrial areas and have been brought into contact with the homes of the people realise the pressing need for the provision of residential schools on open-air lines.

The experience of the War has shown that a suitable generous dietary, regular exercise, and open-air life can bring about a marvellous change in the physique of young adults. Weedy, anæmic, narrow-chested lads from workshops and offices, after some months of army routine become sturdy, self-reliant men, and it is a happy omen that in the majority of cases they appreciate the factors which have led to the change in health, and have

the wish to continue the habits involved in a hygienic way of life.

The extent to which various authorities should establish residential schools must plainly be governed by local conditions, the type of the district, and the amount of insanitation therein.

A cautious estimate would allow for one school, accommodating 100 children, for every 20,000 children attending the public elementary schools.

A residential school should not be used for the reception of incurable ailments; for these, hospitals and other institutions are available. The child most appropriate for admission, bearing in mind that the cost of maintenance per bed will always be relatively high, is one likely to be completely restored to health within a year and unlikely to relapse under the conditions of ordinary school life. Children who are recovering from pneumonia and other illnesses generally respond quickly to treatment, and it might be well to look upon these residential schools as convalescent schools or schools of recovery.

School camps.— Already in a few areas an attempt has been made to follow up advances in open-air education by the experiment of school camps.

All the children at a school, together with the teachers, spend two or three weeks under canvas in a district accessible to the homes. The routine

teaching of the schools is modified somewhat, and two or three meals are served during the day. At night the children return to their homes.

It is not surprising to learn that favourable results are seen in improved health and general well-being. Everyday experience shows that children living in urban areas require every year a period of change of surroundings. To the average child in the public elementary school a summer holiday of more than a few days is an impossibility. The holiday camp, however, opens the way, and it is to be hoped that every urban authority will make use of this opportunity of affording every child an annual respite from the dirty streets and polluted air almost inseparable from industrial towns.

A camp to accommodate 250 children should consist of about seven tents, with a large dining tent. A kitchen, store-room, ablution sheds and closets must be provided.

In fact, the camps and hutments which have arisen during the War are in many instances admirable examples upon which a small school camp should be modelled. Probably it is well to make the kitchen and other offices permanent structures, and to put up the tents as early each year as the season permits.

By arranging a rota over a period of six months, a camp for 250 would serve a school population of 4,000 to 5,000 children.

It is unlikely that all the infants' departments would be able to attend.

The success of school camps, measured in terms of improved health and the enjoyment obtained by the children, irresistibly indicates the need for further developments along similar lines. The senior departments of a school might live for two or three weeks each year in a hutment, within moderately easy reach of the homes; and the camp could possess a permanent administrative staff to deal with the catering and general management. The teaching staff and the children would then occupy the camp until succeeded by another school.

The sanatorium school for pulmonary tuberculosis.—Pulmonary tuberculosis is a comparatively rare disease in children of school age. Nevertheless, adequate provision should be made to place each infected child under conditions best calculated to arrest the disease and to prevent transmission to healthy children. There are three main lines along which the treatment can be carried out.

First, the child can continue to attend an ordinary elementary school, and receive free meals, while the course of lessons is somewhat lightened. Visits to a dispensary at regular intervals will allow for medical attention. Secondly, the child may be admitted into an open-air day school specially set apart for tuberculous children. The construction, equipment, and general routine of such a school

will closely follow that of an open-air school for delicate children, with the addition of more frequent and more complete medical supervision, the systematic taking of temperatures, and some modification in physical exercise and games. Thirdly, there will remain a number of children for whom residential accommodation will be necessary in a sanatorium school. This institution, which should be sufficiently large to allow of some grading of the children for teaching purposes, should not be within the grounds of a sanatorium for adults, although it may be convenient for administrative purposes to have the two buildings under one control. A number of small wards, each containing six to eight beds, will be required, together with one or two single-bedded cubicles for cases of serious illness or for isolation purposes. Dining-rooms and playrooms must be provided, and the usual bath-rooms and closets. Facilities for medical and dental examination and treatment will be needed. The educational routine will approximate to that of an open-air residential school. As many of the children will be able to get up, some simple structure will be necessary for the class-rooms, and in fine weather the teaching can be given on the verandas or in the grounds. A residential medical superintendent should be in charge of the institution, and must decide which of the children are able to attend the classes. One teacher to every twenty

to twenty-five children will be required, and it is important to select one specially trained for the work.

As one of the reasons for the establishment of a sanatorium school is to ensure that a child unfit on account of pulmonary tuberculosis to attend a public elementary school shall not lose several months or, it may be, years of education, only those children should be admitted who are likely to be able to lead a fairly active life—that is to say, moderately early cases of the disease. Children suffering from advanced tuberculosis should be treated in a hospital or sanatorium, and not in a sanatorium school.

At the present time a very real need exists for the provision of further accommodation for children in the early stages of disease, and among the affections for which early treatment can be given with a reasonable hope of success, tuberculosis of the lungs has a foremost place. As there are few areas in which there are enough children needing such treatment to warrant the building of a large sanatorium school, it is advisable for neighbouring education authorities to combine in a joint scheme.

Sanatorium school for surgical tuberculosis.—Tuberculosis of bones and joints is responsible for the greater part of the deformities of children, including the hunch back, and one form of hip-disease.

It is unfortunately true that in scarcely one school area is there adequate provision for dealing with the ravages of this crippling infection. Under modern methods of open-air treatment, with complete immobility of the affected part for several months, and in some instances for more than a year, recovery is likely to be complete.

In many cases hardly a trace of deformity is left. With a few exceptions, the alternatives for a child suffering from surgical tuberculosis now lie between treatment at home and admission into a general hospital. The former is hopeless, the latter as a rule unsatisfactory.

In the average home it is impossible, even with the daily visits of a nurse, to secure the continuous attention, absolute rigidity, fresh air, sunlight, and suitable food that are essential for success.

Comparatively few general hospitals possess a fully-equipped orthopædic department under the direction of a surgeon who is a specialist in the work. None has sufficient accommodation to cope with all the requests for admission. The ever-urgent call of new patients irresistibly leads to the too-early discharge of those under treatment.

As soon as tuberculosis of bone or joint is discovered, the child should be taken into a sanatorium school. In site and surroundings this institution is an open-air residential school. In construction, some modifications must be made to fit the building

for the special treatment to be carried out. Wards containing about ten beds each, the south side opening on to a veranda, should be provided, and an operating theatre, plaster room, and X-ray room will be necessary, with dining-rooms. day-rooms, and one or two class-rooms or workshops for the children who are able to move about. The staff quarters and administrative offices should be in a separate building.

As many of the patients remain in bed for long periods, the arrangements for teaching must be somewhat elastic, and allow for instruction being given in the wards to children recumbent in bed.

The sanatorium school should be under the charge of a resident medical officer, and should provide accommodation for not less than 150 to 200 children. The larger the institution, the more efficient are the facilities for treatment and teaching likely to be.

An orthopædic surgeon and a dentist should visit the school at regular intervals.

When the child leaves the sanatorium school, constant watch must be kept over its home surroundings and state of health.

If possible, attendance at an open-air school should be permitted for a year or two.

A **cripple-school** may be regarded as an open-air day-school, mainly admitting quiescent cases of deformity—ill-nourished, anæmic, breath-

less children who are crippled by disease no longer active. Unless the site is readily accessible, steps must be taken to convey to and from the school the children who find a difficulty in walking. The furniture provided must be suitable for the needs of each scholar. Adjustable tables, wicker chairs, cushions, back-rests, supports of various kinds, and wheel chairs will be required. Remedial physical exercises should be given under medical supervision, and in view of the permanent nature of many of the deformities, manual work and the teaching of a trade are essential to equip the children for the struggle before them on leaving school. The staff should include a head teacher, class teachers, and domestic servants. A nurse should be present during the whole of the day, and a medical officer should, at frequent intervals, systematically examine each child.

Special schools for the blind and deaf.—Education authorities, particularly those dealing with large numbers of children, should seriously consider the erection of day-schools and residential schools for the blind and deaf. The need for such accommodation is pressing, and it is surely time to shed the prevailing impression that a blind person does not require or appreciate cheerful surroundings, sunlight, and fresh air.

Bright, airy class-rooms, workshops, dormitories, and dining-rooms should be part of a

residential school for the blind and deaf. Domestic work, gardening and farm work, and poultry-keeping should be taught. Careful instruction in Braille is necessary in the case of the blind, and, for the deaf, lip reading and voice production. The teachers themselves should have had an efficient training. The main objects to be achieved in attempting to educate the children are firstly to build up a sense of security and self-reliance, and secondly to evolve craftsmen skilled in remunerative branches of work.

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PRINTED BY CASSELL & COMPANY, LIMITED, LA BELLE SAUVAGE, LONDON, E.C.4
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